



INSIGHT

September 1995
Issue 9

St. Louis Symposium: A Tremendous Success! Stats Galore!

Ellen Barker, barker@rio.engr.washington.edu

The Fifth Annual NCOSE Symposium was eventful in many ways, not the least of which were the numbers. Here is a mini statistical profile.

On the heels of officially becoming INCOSE and international, the '95 symposium had the largest non-U.S. attendance to date -- 48 people out of 627 (8%), representing 34 companies out of 228. This constitutes a rise from 1994, where international participants totaled 5% (37 out of 685). INCOSE regional attendance was as follows: Region I-5%; Region II-20%; Region III-21 %; Region IV-22%; Region V-24%.

Many people took advantage of the symposium to join INCOSE or renew their membership: 160 new and 141 renewing members. 560 of the 627 attendees were INCOSE members. Of the initial 194 papers submitted, 130 were chosen for presentation and 31 for poster/ alternate slots. Twenty-one poster papers were eventually presented at the symposium.

In the professional development arena, 254 took advantage of the five tutorials plus the academic workshop this year, comparable to 1994.

The two special events drew the highest numbers yet -- 165 for the Mississippi riverboat cruise and 48 for the McDonnell Douglas tour. Without a doubt, Scott Adams, our banquet speaker, was a real crowd-pleaser and will be a tough act to follow! If we're lucky (or unlucky!), we may see INCOSE-inspired material appear in subsequent Dilbert strips.

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Engineering of Systems in the 21st Century... Second Workshop addresses "Facing the Challenge"

Ellen Reich, Naval Surface Warfare Center,
Edited by Dona Lee, Strategic Insight

More than 175 senior-level engineers from industry, the Department of Defense, government laboratories and academic institutions gathered on 12-14 June to explore solutions to the challenges facing the engineering community in the 21st century. The Second Annual Workshop on Engineering of Systems in the 21st Century (WES 21), was jointly sponsored by the Office of Naval Research (ONR), the Naval Surface Warfare Center (NSWC), and the Naval Command, Control and Ocean Surveillance Center, was hosted by the NSWC Dahlgren Division. The workshop was aimed at sustaining the capability to architect, engineer and produce complex sys-

(see Challenge, Continued on page 31)

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Contacting INCOSE's New Central Office

For any inquiries, please contact the Central Office:

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Seattle, WA 98121

Phone: (800) 366-1164 (in Seattle, use 206-441-1164)

Fax: (206) 441-8262, Email: incose@halcyon.com

Office hours are Monday through Friday, 9 A.M. to 5 P.M., Pacific time. Voice mail is available for after hours or when the phone line is busy.

Finally, the ultimate definition of requirements management

door (dôr, dôr) **n. 1.** An entrance or passageway.
2. A means of access.

DOORS (dôrz', dôrz') **n. 1.** Dynamic Object Oriented Requirements System. The definitive requirements management and traceability software.

in·doors (in-dôrz', -dôrz') **adv. 1.** In or into a building.

InDOORS (in-dôrz', -dôrz') **n. 1.** Users' group for active users of DOORS.

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DOORS Users' Group Meeting Now Twice Yearly!

By popular demand the DOORS Users' Group Meeting is to be held twice a year. This decision was made at the highly acclaimed 1995 InDOORS meeting which was held in St. Louis in July.

The next meeting will be in January 1996 in Florida. For more details contact Bill Miller, the InDOORS chairman at (201) 386 5339 or william.d.miller@att.com

PRESIDENT'S CORNER

Jim Brill

In this issue, I grade our progress toward achieving the 13 goals and four challenges I presented at the January 1995 winter workshop in Houston (see Issue 7, *INSIGHT*, March 1995), but first, some comments on what must be considered another very successful event. The Symposium Planning Committee chaired by Rich Schwadron, the Midwest Gateway Chapter, President, Dean Bristow, and support of McDonnell Douglas Aerospace merit a special "Well Done" and "Thanks." The output of the Technical Board (chaired by Eric Honour and the technical committee chairs and working group chairs and members) the contributions of the administrative committee chairs and their members, and the work accomplished by the National Board and Shirley Bishop made the 5th Annual International Symposium a professionally rewarding experience. On behalf of the National Board, I want to thank our Secretary, Joe DeFoe, for a remarkable job of recording the symposium minutes. Thanks to all authors and presenters — your contributions are a key benchmark for judging the overall professional success of the symposium. The vendor displays and presentations were first rate and informative. INCOSE hopes to see you all in Boston in 1996!

To those people who deserve recognition, but are not mentioned by name, please know that your contributions are greatly appreciated.

Now for our "report card" on progress toward meeting the goals, a.k.a., "Brill's Dozen."

1. Make sustained and meaningful progress toward meeting the purpose and objectives set forth in our charter. Grade: C.
2. Be able to measure and evaluate our progress in attaining our purpose and objectives. Grade: D.
3. Sustain and support increased growth in general membership, chapters, and corporate membership. Grade: C+.
4. Create and maintain a new comprehensive five-year plan. Grade: D.
5. Improve our internal operating procedures. Grade: C+.
6. Generate greater net income. Grade: D.
7. Invest in high-leverage activities — we cannot be the "Best-of-the-Best" without investing in our future. Grade: D.
8. Continue publishing a Quality journal and newsletter. Grade: C. (Journal: issue quality = A, sustaining = D; Newsletter: quality and sustaining = A.)

9. Change our chartered name to INCOSE — the International Council On Systems Engineering. Grade: A.

10. Plan the 1998 annual symposium outside the United States. Grade: C.

11. Establish and fund an award program to recognize individuals and/or teams for outstanding contributions to the advancement and practice of Systems Engineering. Grade: D.

12. Increase the diversity of NCOSE's membership and sponsorship. Grade: C+.

13. Have some fun! Grade: C+.

Based on the above individual grades, I would rate our progress an overall "C-". Time and space precludes my commenting on work in progress to raise our performance to a higher level in this issue. However, in the next issue I'll provide more details on the plan of action. I welcome your comments and suggestions. Please call or send me your feedback (fax: 408-647-9154). I am cautiously optimistic that we will enter 1996 positioned to make continuous improvement in meeting those goals not met in 1995.

I continue to believe that meeting the above goals requires that we focus on: Customer, Communication, Commitment, and Contribution. Collectively, I believe our an overall Grade of C is fair for the four C's.

Symposium Proceedings on CD-ROM

Bill Schoening Technical Presentations Chair

As many have already discovered, the CD-ROM containing the Proceedings of the 1995 Symposium is a significant step forward. Thanks to the financial support of PRC and the hard work of Bill Wittig and his staff of editors, this year's CD-ROM is colorful, easy to use, and just plain fun.

Bill Wittig used *Netscape*®, the popular World Wide Web browser, for the user interface. Every CD-ROM owner is now also a licensed owner of Netscape which can be used to surf the WWW.

Hotlinks and bookmarks allow readers to quickly navigate through the contents, and then backtrack. Color graphics in several papers enhance readability. High fidelity photos, such as those in a paper by Brown and Lavender, are beautifully reproduced. The same CD-ROM works on PCs, Macintoshes, and UNIX platforms.

You can obtain a copy of the 1995 CD-ROM for \$60 from the INCOSE Central Office (see page 35). Copies of the Proceedings in hard cover are available at the same price. Copies of the CD-ROM from last year are also available.

Other Highlights from the 1995 St. Louis Symposium

Best Presentations at the 1995 Symposium

Bill Schoening, Technical Presentations Chair

During the 5th Annual Symposium on Systems Engineering, 130 papers were presented. Attendees graded presentations in four categories: (1) addressing key SE issues, (2) usefulness and applicability, (3) use of good examples, and (4) advancing the state of the art. Authors whose presentations earned the highest score compared to others in the categories below were awarded a certificate the symposium logo and a souvenir coffee mug. An encore of the presentation with the highest score was presented to the plenary session on Wednesday afternoon. In addition, the winner of the overall best presentation was awarded \$50. All members of INCOSE will receive reprints of these outstanding presentations in the next few months.

The six winners are:

Best Presentation at the Symposium and Best Presentation on Systems Engineering Management:

Ronald Carson, *A Set Theory Model for Anomaly Handling in System Requirements Analysis*

Best Presentation on Systems Engineering Processes and Methods:

Kevin Forsberg, *'If I Could Do That, Then I Could...': System Engineering in a Research and Development Environment*

Best Presentation on Emerging Applications:

Eric Honour, *Principles of Commercial Systems Engineering*

Best Presentation on Education and Training:

Jean Garthwaite and **George Huff**, *Multimedia Documentation for the Software Maintainer*

Best Presentation on Modeling and Tools:

Jonathan Hodapp and **Scott Hyer**, *The Role of Modeling in the Development of Large Systems*

Best Presentation on Systems Engineering Measurement:

Kerina Cusick and **Ilene Minnich**, *Industrial Collaboration Systems Engineering Capability Maturity Model Description and Overview of Hughes Pilot Appraisal*

Rounding Out the Top 15 Presentations

Bill Schoening, Technical Presentations Chair

Selecting "best in category" always seems to leave other outstanding presentations unrecognized. Look over these top 15 not only for their content, but for the common characteristics that made them so well received. The nine papers that round out the top 15 across all categories (alphabetically by author) are:

James Armstrong, *Failure Mode Analysis in Systems Engineering*

Laurence Bellagamba, *Testing Knowledge of Systems Engineering Process Fundamentals*

Phillip Brown and **Jack Lavender**, *Virtual Prototyping: Results Illustrate Utility in Developing Weapon System Requirements*

Kevin Forsberg and **Harold Mooz**, *Application of the 'Vee' to Incremental and Evolutionary Development*

Edward LaBudde, *Requirements Management: Contrasting Traditional Systems and Software Engineering Methods*

William McCumber, *System Performance Representation: Standard Scoring Functions*

Herve Rochecoste, *A Systems Engineering Capability in the Global Market Place*

Sarah Sheard and **M. Elliot Margolis**, *Team Structures for Systems Engineering in an IPT Environment*

Randii Wessen, *A Systems Engineering Approach to the Analysis of a Planetary Mission Ground System in Terms of Science Objectives*

CD-ROMs Not Picked Up at Symposium

Bill Schoening m138022@SL1001.mdc.com

If you did not pick up your CD-ROM at the Symposium, send me a fax of your CD-ROM ticket at 314-777-1139 along with your name and address so I can mail your copy to you.

DID YOU KNOW...

Systems Engineers from around the world are checking out INCOSE's World Wide Web (WWW) Home Page every few minutes? You can look at usage statistics at:

<http://usw.interact.net/ncose.wwwstat.html>.

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TECHNICAL COMMITTEES & WORKING GROUPS

Technical Board

Eric Honour, Chair, ehonour@harris.com

Back again from another INCOSE symposium, I am struck again with the quality of INCOSE people. Paper presentations, tools vendors, hallway conversations, and INCOSE business all reflect outstanding professionalism.

Many members do not see what goes on behind the symposium. Spend some time reading the following articles from various technical groups to find out. You also will be struck by the selfless dedication of these volunteers who are improving our discipline.

For the first time, INCOSE now has products available to the general public. The Technical Board gave interim approval to both the SE Capability Assessment Model and the Metrics Guidebook for publication as INCOSE Technical Papers. You may obtain copies of these excellent documents through the new central office. The Capability Assessment Working Group and the Metrics Working Group have done their jobs well! (And they continue to improve both products — watch for future releases.) As another product, the Tools Database Working Group presented an impressive on-line demonstration to the plenary session. Using an overhead projector connected to his laptop, Mark Sampson showed in real time the tools database product that is available to all on the WWW. Access the database through the INCOSE home page.

Also for the first time, INCOSE now has an approved position on a topic. Such approval requires acceptance by both the Technical Board and the Board of Directors. This position is a simple but important one:

SYSTEM
A "system" is an interacting combination of elements, viewed in relation to function.
This definition is now an official INCOSE position, approved by both the Technical Board and the Board of Directors.

our definition for the word "system." (See side box.) A companion definition for the term "systems engineering" is in the works.

The Technical Board is also developing a standard annual cycle for the working groups that will lead to annual product deliveries. This development is in response to repeated observation that only a few working groups are effectively creating products. Many others operate only as interest groups, allow-

ing members a forum to discuss topics without specific output. (There is nothing wrong with interest groups, incidentally, but there is a distinction between interest groups and working groups.) By the Winter Workshop

in January '96, this cycle will be in place. Technical Committee chairs will be providing information to Working Group chairs over the next two months. We may even provide chair training at the Workshop.

We have added two new working groups recently — SE Management Methodology and Model Driven System Evolution. Five other working groups were reclassified as interest groups due to lack of specific goals.

In a departure from usual format, the next issue of INSIGHT will be dedicated to the technical working groups. That entire issue will contain more comprehensive articles and information from each working group, with a lead-in from the Technical Board and Technical Committees. Watch for it — you will have the chance to get a much larger look into the workings of the International Council on Systems Engineering.

Modeling and Tools Technical Committee Symposium Report

Brian McCay, Chair, bmccay@mitre.com

The '95 International Symposium in St. Louis provided an excellent forum for our MTTC Working Group meetings, as well as an opportunity for our members to show-off the progress we've made. At the plenary session, the Tools Database Working Group Chair, Mark Sampson, introduced the membership to the MTTC's WWW home page. This home page, under INCOSE's home page, introduces the MTTC, contains information on our work program and how to join, and provides valuable survey information on tool vendors. If you have not yet visited our home page, the url is:

usw.interact.net:80/INCOSE/workgrps/tools/mttchp.html

We also published a WG paper that describes our efforts with the requirements management tool vendors and the survey results that are now available on the Web. Karyl Miller gave an excellent presentation to the CAB on our intentions within the Tools Integration Interest Group to address their priority item regarding an integrated systems engineering environment. Details of all our activities can be found on the Web.

Fall Meeting Announcement. Thanks to Bill McMullen and Dorothy Kuhn for arranging to have Texas Instruments host our Fall Working Meeting at TI's Training Center in Dallas. The Fall meeting will be held on Thursday and Friday, October 26th and 27th. Please contact Brian McCay or the WG or Interest Group chairs for further details.

SE Capability Assessment Activities

Blake Andrews, SYS_BAA%SOLONBhobbes.cca.rockwell.com

The Capability Assessment Working Group (CAW) is chartered "To lead a broad-based INCOSE initiative to develop a method for assessing and improving the efficiency and effectiveness of systems engineering." The goals of the CAW are twofold: (1) developing a Systems Engineering Capability Assessment Model (SECAM) and (2) gaining industry and Government acknowledgment and acceptance of the SECAM.

Organized in 1992, the CAW has successfully developed a SECAM (Interim Model) along with supporting products for conducting Systems Engineering Process Assessments (SEPAs). The CAW has used these products to facilitate SEPAs at selected companies. The model in its present form is called "Interim" because it relies primarily on process maturity as an indication of systems engineering capability. Other indicators have been identified by the CAW. Two such examples are people and technology. The Interim Model will evolve into a complete SECAM as these and other indicators are incorporated.

The SECAM Interim Model and its products were distributed to INCOSE members attending the 1995 Symposium and may be found in Volume II of the Proceedings. Additional copies of this material are available to INCOSE members by contacting the INCOSE Central Office (see page 35).

CAWG-facilitated SEPAs represent an opportunity for INCOSE members to host an assessment at minimal cost to their organization. The benefits of a SEPA include: (1) identifying an organization's strengths and weaknesses with respect to systems engineering; (2) fostering buy-in for improving the organization; and (3) establishing a baseline for measuring further improvement. The CAW uses SEPAs to train its members to facilitate future assessments and to improve the SECAM and its supporting documents. Members of the CAW interested in conducting an assessment at their respective companies, are actively encouraged to participate in a SEPA to learn about the assessment process. The CAW is available on a limited basis to facilitate assessments for members of INCOSE. For further information regarding facilitated assessments, please contact one of the CAW chairs (see page 11 for contact information).

To date, three SEPAs have been conducted using the Interim Model. Two were facilitated by the CAW. The third was conducted by CAW member without the participation of the CAW. Experiential data from each SEPA has been used to incrementally improve the model. A fourth SEPA facilitated by the CAW, is scheduled for

September 1995.

Looking Ahead. The CAW is seeking individuals to assist in several initiatives: (1) continued facilitation of SEPAs to learn more about the assessment process; (2) continued improvement of the Interim Model into a "complete" SECAM; (3) beginning development of summary information on other models which attempt to measure systems engineering capability; and (4) further use of the Interim Model to promote synergism among INCOSE Working Groups with related interests. The Interim Model is already being used by the Metrics and Benchmarking Working Groups.

The next CAW meeting is scheduled for October 17-18. INCOSE members with an interest in systems engineering capability assessment are encouraged to attend. To be placed on distribution for official meeting announcements, please contact any CAW chair for information on upcoming activities.

American National Standard On Systems Engineering

James N. Martin, jnm@hogpa.att.com

A project has been started to develop the American National Standard for the Engineering of Systems. This is a joint project of INCOSE, EIA, and IEEE initiated by the EIA G-47 Systems Engineering Committee in April 1995 under the ANSI Project Number PN-3537.

A Working Group has been formed to manage the project consisting of three members each from INCOSE, EIA and IEEE and one liaison member (Raghu Singh) from the International Standards Organization (ISO). Alternates have also been designated. The Working Group is led by James Martin from AT&T Bell Labs. The INCOSE co-chair is John Snoderly and the IEEE co-chair is Richard Schmidt.

The charter of the Working Group is to convert the EIA Interim Standard (IS 632) to a full standard that is compatible with all industry sectors. The standard is intended to be a top-level, streamlined version of the current existing standards (EIA/IS 632 and IEEE 1220) with an expected page count of 20-30 pages. Expected release date is 1Q97.

The ANSI standard will define two separate processes. The first process, called the Engineering of Systems, describes the system life cycle activities associated with engineering of the primary user product and all related products and processes for development, manufacture, verification, deployment, training, support and disposal. The system life cycle activities can be correlated with the different "program phases" used in different industries.

The second process is the Systems Engineering process "engine" that is used iteratively and recursively

throughout the Engineering of Systems process. The current version of EIA/IS 632 defines the Systems Engineering activities as: Requirements Analysis, Functional Analysis/ Allocation, Synthesis, and Systems Analysis and Control. The ANSI standard will not necessarily use these names nor this particular configuration of tasks.

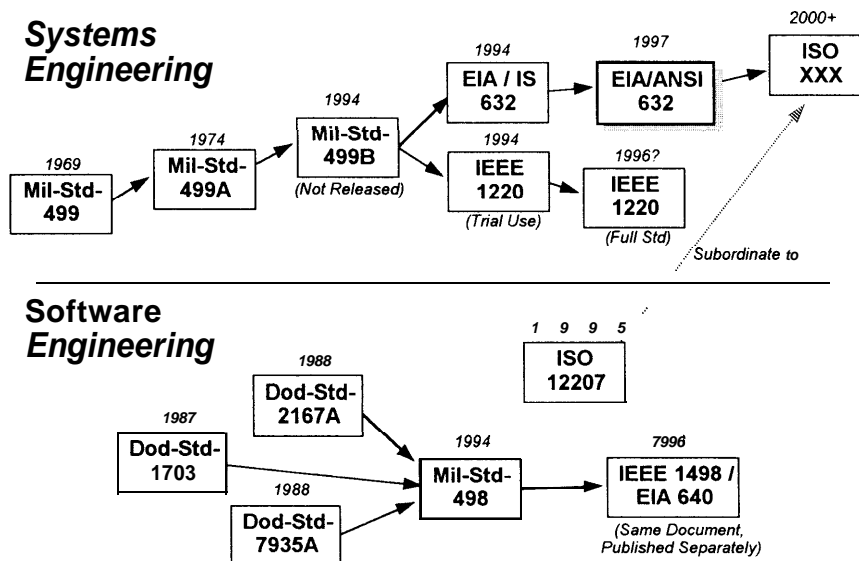
The Working Group will be working closely with the international committee that is developing the ISO standard on Systems Engineering. Raghu Singh leads the ISO

effort and is a member of the ANSI Working Group.

If you would like to be an INCOSE Key Reviewer for intermediate products from the Working Group, please contact John Snoderly at (703) 805-3697, or by email: snoderlyj@dsmc.dsm.mil.

The current versions of EIA/IS 632 and IEEE 1220 can be obtained from Global Engineering at (800) 854-7179.

History of Systems Engineering Standards



Benchmarking Working Group

Gerard H. Fisher, gfisher@hq.caci.com

One of the Benchmarking Working Groups strategic objectives is to assess the general state of practices and trends in systems engineering through a nationwide survey of INCOSE member companies. To that end, we have put the following plans in place:

- ◆ Utilize the key focus areas of the INCOSE SE Capability Assessment Model (SECAM) as the framework.
- ◆ Develop a common template for categories of questions to be asked.
- ◆ Establish a World Wide Web home page for our working group to communicate with membership and solicit comments on survey.
- ◆ Pursue electronic distribution of the survey

We need your help! The Benchmarking Working Group needs expert help to develop the survey, solicit participants in the survey, review draft survey and analyze results of the survey. Please contact Jerry Fisher

(703-841-8824, gfisher@hq.caci.com) to join us in this endeavor. In addition, our working group is always available to assist others in obtaining information concerning benchmarking procedures and results.

Emerging Applications Working Group Activities

William Mackey, wmackey@cscgt.gsfc.nasa.gov

The Emerging Applications Working Group (EAWG) is chartered to "Facilitate the introduction and application of systems engineering practices to a wide range of applications in the commercial sector, both government and private industry, so that the public may be provided with high-quality goods and services at affordable and appropriate cost."

The EAWG met in July at the 5th International Symposium of INCOSE in St. Louis, Missouri. The meeting on July 25th was chaired by William Mackey, and the meeting on July 26th was chaired by Carolyn Buford.

The EAWG now has an approved charter, an aggres-

sive schedule for 1995-96, and a good solid Emerging Applications White Paper with content and several actions underway. Our goals are:

1. Release the second draft of the Emerging Applications White Paper. At the meetings the EAWG unanimously approved the second draft (dated July 1995) for release.
2. Develop the third draft of the EAWG White Paper. The goal is to update the White Paper annually and the third draft may be achieved as early as January 1996.
3. Conduct two to four Emerging Applications Sessions at the 6th Annual International Symposium in Boston, MA on diverse emerging applications. (There were 3 such sessions this year.)
4. Conduct two additional directed Emerging Applications Sessions at the same symposium in specific topic areas which are growth areas such as the following:
 - a Highway Transportation Systems (William Mackey)
 - b Telecommunications Systems (Carolyn Buford)
 - c Natural Resource Management Systems (Fred Martin and Ted Dalton)

Anyone interested in submitting papers in these areas for this symposium are reminded that the papers must be submitted by end of September 1995. Please contact the above coordinators in addition to submitting the paper through the proper channels.

5. Recommend keynote speakers in one or more of the above applications areas to promote the changing focus of systems engineering. Names mentioned in our discussions (and dreams) include Steven Spielberg and/or Bill Gates for Telecommunications, or Lee Iaccoca for Highway Systems).
6. Stimulate INCOSE Interest Groups in local chapters such as:
 - a Detroit/Tri-State: Motor Vehicle Systems (Bob Ottoline)
 - b Texas Gulf Coast: Energy Systems (TBD)
 - c Chesapeake: Telecommunications Systems (Carolyn Buford)
 - d Washington Metro: Highway Transportation Systems and/or Criminal Justice and Legal Systems (William Mackey)
 - e New England: Health Care Systems (Pat Hale)
 - f San Francisco Bay Area: Natural Resource Management Systems (Ted Dolton)
7. Initiate contact with universities which offer a systems engineering curriculum to gain their participation in the EAWG.

The EAWG board members consist of a:

- a Chairperson — William Mackey for a 2-year term

- b Co-chairpersons — Carolyn Buford
- c Secretary — Pat Mackin

Anyone interested in rolling up the sleeves and supporting the goals and interests of the EAWG please contact William Mackey (wmackey@cscgt.gsfc.nasa.gov), or Carolyn Buford (carolyn.buford@cscgt.gsfc.nasa.gov).

INCOSE Certification of Systems Engineers

Phil Brown, brown_pj@lvs-emh.lvs.loral.com

Should INCOSE take on the responsibility for certifying systems engineers? In airing this subject during the Education and Training Workshop held in conjunction with the Fifth International Symposium in St. Louis, the group consensus was — not at this time. The primary purpose for deferral was to sidestep clashing with professional engineering state licensing laws.

The very real possibility of conflict was illustrated by an account of an advertisement entitled "Why become a Certified Systems Engineer." The advertisement appeared in the Dallas Morning News in February this year. A local company, in affiliation with Microsoft, offered to teach a series of courses that would result in the student, upon completion of the program, becoming a Microsoft Certified Systems Engineer (MCSE).

Letters to the Texas State Board of Registration for Professional Engineers and the National Society of Professional Engineers (NSPE) produced a response from the general counsel for the NSPE. The response said that the Microsoft program, and a similar program by Novell, were being studied "to determine whether these programs are in violation of state engineering licensing laws." In addition, the National Council of Examiners for Engineering and Surveying (NCEES) was working with NSPE to determine how to address the issue. The advertisements have not been seen since early March.

In Texas the law specifies that use of the word engineer in offering services to the general public is reserved to those persons "duly licensed, registered under and practicing in accordance with the provisions of" the Texas Engineering Practice Act. Given the current maturity of INCOSE, which is manifested in lack of widespread recognition by other engineering organizations and many engineering schools, the Education and Training working group concluded that becoming a member of the Engineering Accreditation Commission (EAC) of the Accreditation Board for Engineering and Technology (ABET) is a prerequisite to getting involved in certification programs.

People on the Move...

Jerry Fisher recently accepted a new position as the corporate Director of Enterprise Process Improvement at CACI Inc., Arlington, VA. He is responsible for the improvement of the systems engineering and software development processes. In addition, he is chartered with overall enterprise process improvement to include Total Quality Management and ISO-9000 registration. Prior to joining CACI, Jerry was Manager of the Integrated Process and Tools Group at Loral Federal Systems, Manassas VA. Jerry chairs the INCOSE Benchmarking Working Group.

Pat Hale accepted a position as Director, Systems Engineering for Otis Elevator Company, responsible for developing and instituting a contemporary commercial systems engineering process, including selection of standard tools and methods, and development of long-range, system-level product plans to guide evolution of Otis products worldwide. Pat is soon-to-be chair of the Communications Committee and is Technical Paper Chair for the 1996 Symposium in Boston.

Dorothy McKinney was recently named Loral corporate Director of Software and Systems Process, a new position. In addition, she is still a senior vice president in the Loral Air Traffic Control division. Dorothy co-chairs the SE Processes and Methods Technical Committee.

Ken Porter, formerly with Harris Space Systems in Melbourne, FL, is now with Loral Federal Systems in Orlando, FL, working on simulation projects.

Timothy B. Smith has accepted a new position as Senior Partner with Systemic Solutions in Palm Bay Florida. Tim is a co-chair of the Systems Architecture Working Group.

Dick Wray is now a Senior Engineering Specialist responsible for developing and implementing SE and related processes division wide for Loral Defense Systems in Akron, Ohio. In September 1994, Dick left Lockheed Engineering and Sciences Company, Houston, TX, due to the aerospace business downturn. Just prior to his new position, Dick was consultant and contractor for several companies. Dick is the chair of the Systems Engineering Processes working group and is co-chair of the Processes and Methods Technical Committee.

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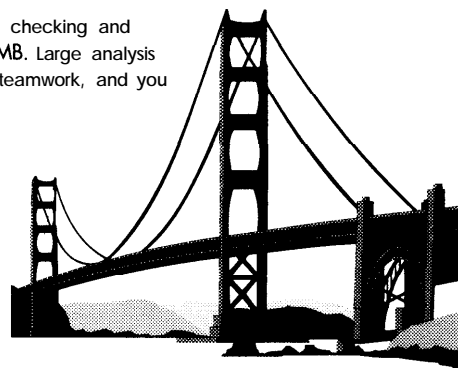
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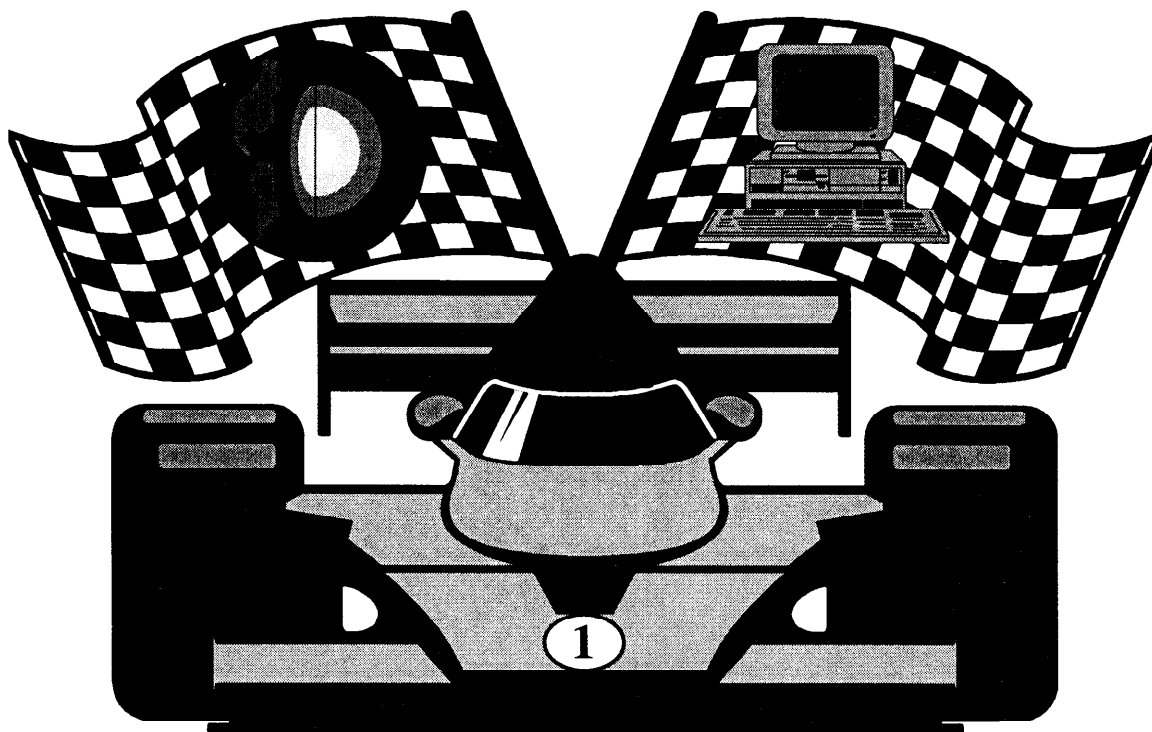
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LOCAL CHAPTER NEWS

Detroit Tri-State

Charlotte A. Paul, Communication Committee,
76433.1010@compuserve.com

The Detroit Tri-State Chapter recently held elections for three Board of Directors positions. Our newly elected Directors are: Marty Slabey, Director of Ways and Means, Joe Morave, Director of Communications, and Tom Wroblewski, Secretary. Congratulations to our new Board Members! Our next election cycle begins in October, 1995. Positions up for election are Director of Membership, Director of Program Planning, Treasurer, and President-Elect. We are always looking for interested individuals to help our chapter grow and flourish. If you would like to nominate someone, including yourself, please contact Marty Slabey (313) 390-5791 or e-mail 75512.3102@compuserve.com.

The Detroit Tri-State Chapter is co-sponsoring two training courses, both titled "World Class Systems Engineering," on September 9 -13 and October 2-6. Classes will be conducted by Dr. Jerry Lake and Mr. Jim Brill of Systems Management International. The courses are co-sponsored by Ascent Technologies, Inc. of Ann Arbor, MI, and will be conducted at their facilities. Class size is limited. Contact Joe Bedocs (313) 594-3475 for more information.

Dr. Lake and Mr. Brill will be guest speakers at our October 4 Chapter meeting. This meeting will be held at Ford Motor Company — Product Development Center in Dearborn, MI. We will close out our 1995 program schedule on November 15 with the last Case Study Tutorial series based on the IEEE 1220 Systems Engineering Standard. The last topic is Analysis and Control, and will be held at ITT Automotive in Auburn Hills, MI.

Our chapter's bi-monthly programs rotate locations among the major automotive companies and automotive suppliers in the Detroit area. For more information contact Dan McClure, President-Elect, (810) 753-0198.

Washington Metropolitan Area

Sarah Sheard, sheardsarah@lfs.loral.com

The WMA chapter has held monthly meetings this year, after meeting every two months last year. In June, Dave Steffy, Program manager at Orbital Sciences Corporation, told us about some interesting design tradeoffs on the Orbcomm satellite. In July, four members who presented featured papers at the symposium gave the papers to the local chapter as a "dry run." In August, Dr. Harry Crisp, luncheon banquet speaker at the symposium,

discussed Systems Engineering in the 21st Century.

In September, we will hear Dr. Richard Stevens discuss Requirements Analysis, in our first joint meeting with the Chesapeake Chapter. October will offer a panel discussion among chapter members on the topic, "What is the value of Systems Engineering?," and in November, our last meeting of 1995, Dr. Wolt Fabrycky will give a demonstration of some of his systems engineering methods and tools.

This year our chapter used a meeting format of reception and dinner, one-hour speaker, a break, and then about 45 minutes of discussion of systems engineering topics at breakout tables. The "Topics Tables" interest started high but declined. Theories are that people are tired after a full workday, and that many chapter members are already too involved in the central organization to do much at the local level. Nevertheless, our speakers have drawn attendance's from 25 to 50 out of a membership approaching 200. Our goals for the year include improving attendance.

Silver State Joins INCOSE!

John Clouet, Interim President

The first official meeting of the Silver State Chapter of INCOSE was held at 7:00 p.m. on July 27, 1995. The meeting was held in the ninth floor conference room of the Bank of America building on Convention Center Drive in Las Vegas, Nevada. The interim officers for the new chapter are:

John Clouet (TRW) — President
Carl Hastings (TRW) — Secretary
Ovadia Lev (TRW) — Membership
Sam Rindskopf (TRW) — Programs
Barry Thorn (Duke) — Treasurer
Richard Wagner (TRW) — Parliamentarian

Chapter committees formed during the meeting are:

Ways & Means Committee — Ken Ashlock (TRW)
Elections Sub-committee — Russell Daniel (TRW)
Technical Programs Comm. — Eugene Cross (TRW)
Tools- Steve Jemigan (TRW)
Communications Committee — Steve Jernigan (TRW)
Newsletter — Kevin Harbert (SAIC)
Symposium Papers Comm. — Jim Robertson (TRW)
Programs Committee — Sam Rindskopf (TRW)

Objectives established for the first year are:

- 1 hold elections of officers,
- 2 establish by-laws,
- 3 hold monthly meetings with featured speakers,

- 4 issue a quarterly newsletter,
- 5 get connected, and establish a chapter electronic bulletin board,
- 6 garner support for the 11th International Conference on Systems Engineering to be hosted by the Silver State Chapter.

For information on the Silver State Chapter of INCOSE contact Kevin Harbert at (702) 794-7637 or email kevin_harbert@notes.ymp.gov.

New Mexico Chapter now forming

Keith Ortiz, kortiz@sandia.gov

Systems engineers at Sandia National Laboratories in Albuquerque, New Mexico, are discussing starting a local INCOSE chapter. If you are interested, please contact either Keith Ortiz (kortiz@sandia.gov, 505-844-2072) or Frank Dean (ffdean@sandia.gov, 505-844-5202), Sandia National Laboratories, Department 5102 MS 0435, Albuquerque, NM 87185, fax: 505-844-4539. Please send your name, employer, phone number(s), fax number, and email address.

Current goals are to establish the level of interest in a local chapter, the geographical dispersion of potential members, and the purposes of the chapter.

WANTED! SYSTEMS ENGINEERS!

Hughes Systems Engineering and Manufacturing Systems, a division of Hughes Aircraft Company, is expanding its Troy, Michigan operations. We are located in southeast Michigan in the suburbs north of Detroit. Our staff is responsible for supporting various organizations within General Motors.

We are looking for candidates with experience in systems engineering, program management, design development, and manufacturing systems design and support. We also have positions for people with experience in human factors, validation, software design, and program and process development. Opportunities also exist in Germany (fluency in German is required), Australia, Sweden, France, and Asia.

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Proof of U.S. Citizenship may be required.

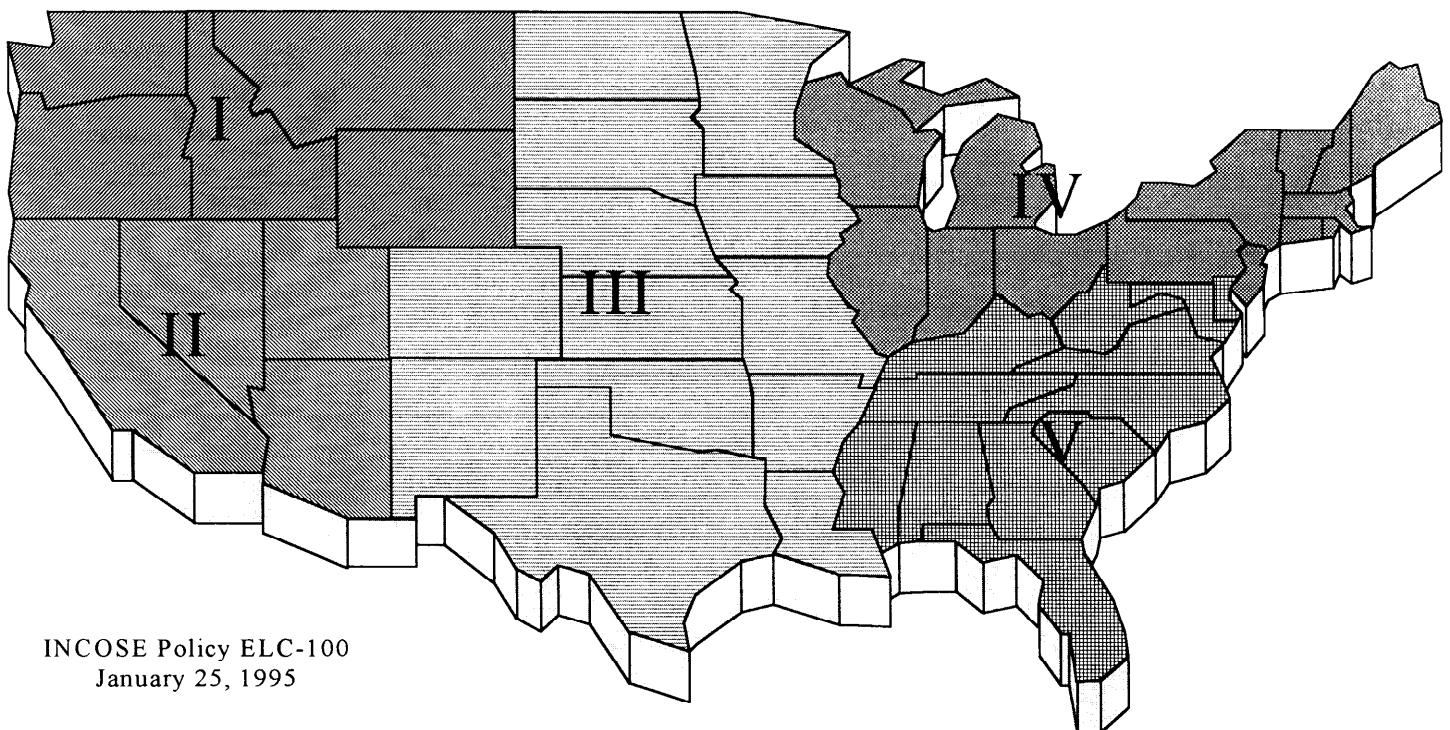
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INCOSE Local Chapters and Contacts

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	<i>Tri-Cities</i>	Richland, WA	T. Woods	(509) 946-0101
Region II: Govt./Acad.: Wayne Wymore, (602) 299-6663 Industry: John Olsen, (310) 607-1293	<i>San Francisco Bay Area</i>	San Francisco, CA	R. Olson	(415) 966-3524 / (415) 966-2585
	<i>Sanland Empire</i>	San Bernadino, CA	C. Kondrack	(909) 383-3887 / (909) 383-3846
	<i>San Diego</i>	San Diego, CA	D. Clemons	(619) 458-5215 / (619) 458-4766
	<i>Southern Arizona</i>	Tucson, AZ	H. Goodkin	(602) 663-6751 / (602) 663-7299
	<i>Central Arizona</i>	Phoenix, AZ	J. Sivak	(602) 585-6849 / (602) 585-7726
	<i>Los Angeles</i>	Los Angeles, CA	S. Jones	(310) 336-8576 / (310) 336-6914
	<i>Salt Lake Valley*</i>	Salt Lake City, UT	H. Reed	(801) 794-7844 / (801) 794-7930
Region III: Govt./Acad.: James Ray, (314) 263-1100 Industry: Dorothy Kuhn, (214) 575-2648	<i>Silver State *</i>	Las Vegas, NV	J. Clouet	(702) 295-9144 / (702) 794-7445
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	<i>Texems Gulf Coast</i>	Houston, TX	J. Stecklein	(713) 244-7146 / (713) 244-8108
	<i>North Texas</i>	Dallas-Ft. Worth, TX	R. Case	(214) 205-5306 / (214) 272-8144
	<i>North Star</i>	Twin Cities, MN	D. Walden	(612) 921-6469 / (612) 921-6869
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Region V: Govt./ Acad.: Wolt Fabrycky, (703) 231-6147 Industry: Larry Pohlmann, (703) 847-1115	<i>Hartford *</i>	Hartford, CT	B. Tupule	(203) 654-9218 / (203) 654-9203
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INDUSTRY BRIEFS

University of California, Irvine Extension Announces a New Certificate Program in Systems Engineering

UCI Extension's new certificate program in Systems Engineering provides up-to-date, practical training to help professionals enhance their knowledge of the systems engineering process and increase their competency level in dealing with complex systems.

In the program, participants will develop leadership skills in identifying, analyzing and troubleshooting complex systems; enhance their knowledge in current systems engineering applications and methodologies; learn to design cost efficiency, testability, operability and producibility into every phase of their work; and improve their skills, technically and managerially.

Interested individuals attended a free Systems Engineering information session on Saturday, September 16, on the UCI campus. A free "Job Search Strategies" seminar preceded the information session. For more information on the information sessions, call (714) 824-7948. To receive a free Engineering and Information Technologies mini catalog, call (714) 824-3413.

One can also view the entire course catalog on the Internet, providing a low-cost and convenient way to view the offerings. The Internet site on the World Wide Web site is: <http://www.unex.uci.edu/-unex>.

1995 Complex Systems Engineering Synthesis and Assessment Technology Workshop (CSESAW '95) **Southern Florida, November 6-10, 1995**

Provided by Beth Clark, eclark@advtech.uswest.com

This workshop is part of the first IEEE International Conference on Engineering of Complex Computer Systems (ICECCS), which will be held in Southern Florida, November 6-10, 1995. The theme of this year's workshop is technology for "real-life" systems. The workshop will explore issues related to design synthesis and assessment in the development of these systems. With focus on large-sized, complex and computer-based systems, the workshop emphasizes technologies for the development and enhancement at the system level. Of interest is the ability to specify, capture, synthesize, analyze, model, prototype, test, and implement such systems for both the forward and reverse engineering processes. Exchanges of lessons-learned and experiences in the design of these systems are encouraged at this workshop. Results of ongoing research (including basic and applied research) in

the areas of dependability, distributed tasking, real-time and time-critical applications, and scalability, as applied to the design and development of "real-life" systems, are also topics of concern.

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Call for Papers: 1996 IEEE Aerospace Applications Conference **Snowmass at Aspen, Colorado** **February 3 - 10, 1996**

Provided by Beth Clark, eclark@advtech.uswest.com

Keynote Speaker: Brigadier General John L. Woodward Jr., Director, Communications/Computer Systems, Air Combat Command

Topic: "Communications/Computer Systems and Plans in Air Combat Command"

The IEEE Aerospace Applications Conference (AAC), sponsored by the IEEE Aerospace and Electronics Systems Society (AESS), is a small, nationally attended week-long conference noted for its high quality. The program theme of aerospace applications recognizes the interdependence of system concepts, research and development of hardware and software, management science, and production. Papers will enhance knowledge of aerospace applications, including:

- ◆ applications of technology to aerospace systems,
- ◆ applications of aerospace systems to users/customers,
- ◆ applications of aerospace technologies to new uses,
- ◆ applications of management science to aerospace industry,
- ◆ government policy that directs or drives aerospace applications.

Persons wishing to be added to the AAC mailing list are requested to send a note with their name, and both their work and their home addresses and phone numbers, and also their e-mail address and fax number, if any. This information can be sent to either of the persons below.

Technical issues:

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 Phone: 310-813-0351 (W), 310-804-1785 (H)

The Snowbird Initiative (Dynamite for Engineers and Others)

Carl Henn, Liberty Chapter, (908) 766-1020

For four days and nights in early August, 1995, a diverse but congenial collection of mostly engineers from the United States and Canada shook hands, smiled a lot, and then got down to work. Behind every handshake lay quiet determination; behind every smile a serious purpose.

The occasion was a mostly engineering conference at Snowbird, Utah on "Sustainable Development: Creating Agents of Change." Co-sponsored by the American Association of Engineering Associations and the Engineering Foundation, with highly visible leadership participation by the World Engineering Partnership for Sustainable Development. The theme of the program was the proactive role of engineers in accelerating needed change toward a cleaner, safer, and better world for ourselves and future generations.

These are nice words, but how do you make it happen? Create a toolkit. In the words of Buckminster Fuller: "If you want to teach someone a new way of thinking, don't lecture to them. Give them a tool, the use of which changes the way they think."

At Snowbird '95 there was unanimous agreement among the fifty conferees on the need for enhancing the earthview education of engineers, including a total life cycle cost approach to systems analysis, system design, and systems engineering. The tools and skills identified by the Snowbird '95 focus groups as most important to create or cultivate were:

- ◆ school and continuous education curriculum development
- ◆ sustainable development indicators and metrics
- ◆ life cycle assessment, environmental cost accounting, and other analytical and decision support software
- ◆ electronic clearinghouse data bases
- ◆ case studies
- ◆ guides and handbooks
- ◆ global networks, consortia, and multidisciplinary communication mechanisms for collaborative rela-

tionships

- ◆ multidisciplinary conferences and forums

The clear consensus of the conferees can be summarized thus: "Engineers have a lot to do and can do a lot, but, hey, we can't do this alone. We need to work with economists, accountants, marketers, ecologists, and others to meet the many challenges of sustainable development. Science, technology, and society are one ball of wax."

Individual members of INCOSE who have some ideas, talent, interest, and/or energy that they wish to devote to human progress, and to enriched professional development at the same time, should fax Carl Henn, Senior Vice President, Concord Energy (Fax 908-766-7523). Please include your name, position, area of interest, phone number, best time to call, and fax number.

Listen to your instincts. Be impulsive. Do it now.

NASA SE Handbook Available Soon

The NASA Systems Engineering Handbook will be available in late September through the Government Printing Office (GPO). A phone call placed on September 12 verified that the handbook was not yet available, did not have a GPO stock number, and was of unknown cost. It is recommended that you call first to verify the handbook is in stock. The contact information is as follows:

Superintendent of Documents
 P.O. Box 371954
 Pittsburgh, PA 15250-7954
 Phone: (202) 512-1800
 Fax: (202) 512-2250

If you order by telephone, have your Mastercard or Visa ready, and be prepared for prompts and holds. Fax orders must also provide a credit card number.

For NASA employees and contractors who use systems engineering, a limited number of handbooks (reference number SP-6105D) is available at no charge as follows:

Tadcorps
 300 7th Street SW, Suite 110
 Washington, DC 20024
 Email: tadcorps@aol.com
 Phone: (202) 554-8677

System Dynamics '96

Provided by Beth Clark, eclark@advtech.uswest.com

The fourteenth international conference of the System Dynamics Society will be held July 22-25, 1996, in Cambridge, Massachusetts. The conference will attract more than two hundred practitioners interested in policy stud-

(See Dynamics, Continued on page 24)

Columnists

Pushing the System

Eric Honour, ehonour@harris.com

Two months ago, I issued a challenge to the INCOSE leadership, a challenge that is summed up in the phrase "Ten Thousand by Two Thousand."

In longer words, let's put the activity in place to achieve 10,000 members by the year 2000. We can start with:

- ◆ An efficient and smooth membership administration.
- ◆ A product database accessible through WWW.
- ◆ Working group products to fill the database.
- ◆ Regular, detailed communications to local chapters.
- ◆ A membership marketing program.
- ◆ Continued publication of Insight on a regular basis.
- ◆ Continued publication of the Journal as part of dues.

For the first three years of NCOSE, it was sufficient to have a few forceful, powerful individuals speaking loudly about the future of the organization. But it has become past time to "put up or shut up." We cannot wield the influence we desire as an organization of less than 2000 members. We need local chapters that draw hundreds of people into active participation. We need international working groups that draw from the best minds of thousands of available members. And we need the financial resources to facilitate progress in those working groups.

In short, we need a continuously expanding membership. We get the membership to grow by providing members with tangible benefits that entice them to continue to put out \$60/year. The kind of tangible benefits that attract the majority of people I know include:

- ◆ Forum to see and be seen, to learn and to teach, on a regular basis, among those people who matter to the individual's career (local chapters with dynamic programs)
- ◆ Information about the environment and discipline that can affect the individual's career (newsletter, Journal)
- ◆ Accessibility to new career-enhancing methods (Journal, symposia, newsletter, local chapters)
- ◆ Opportunity to publish (Journal, symposia)
- ◆ Opportunity to travel once in a while (symposia)
- ◆ Membership identification — cards, logo pins, and up-to-date certificates

We are in the process of making this happen. Our recent contract with Shirley Bishop, Inc., provides the infrastructure that can support both the membership we

(See Pushing, Continued on page 20)

Matters of Consequence

Kevin Minds, ksminds@ccgate.hac.com

"Oh no!" I cried. "No, no, no! I don't believe anything. I answered you with the first thing that came in to my head. Don't you see - I am very busy with matters of consequence!"

He stared at me, thunderstruck. "Matters of consequence!" He looked at me there, with my hammer in my hand, my fingers black with engine-grease, bending down over an object which seemed to him extremely ugly...

"You talk just like the grown-ups!"

That made me a little ashamed. But he went on, relentlessly: "You mix everything up together... You confuse everything.."

He was really very angry. He tossed his golden curls in the breeze.

"I know a planet where there is a certain red-faced gentleman. He has never smelled a flower. He has never looked at a star. He has never loved anyone. He has never done anything in his life but add up figures. And all day he says over and over, just like you: 'I am busy with matters of consequence!' And that makes him swell up with pride. But he is not a man - he is a mushroom!"

Antoine De Saint-Exupery, *The Little Prince*.

Good morning! Jon Ochiai called me and asked if I would join him, and some other Hughes engineers, and talk to a group of eighth graders at Lennox Middle School. We had some bus testing to run that day and I was pretty busy preparing for the "Systems Thinking" class, but Jon is one of those incredibly nice guys that make you feel guilty just by saying "Hi!" to you, so I told him I'd be there.

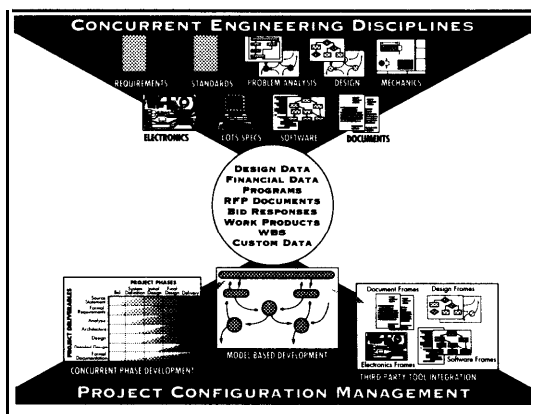
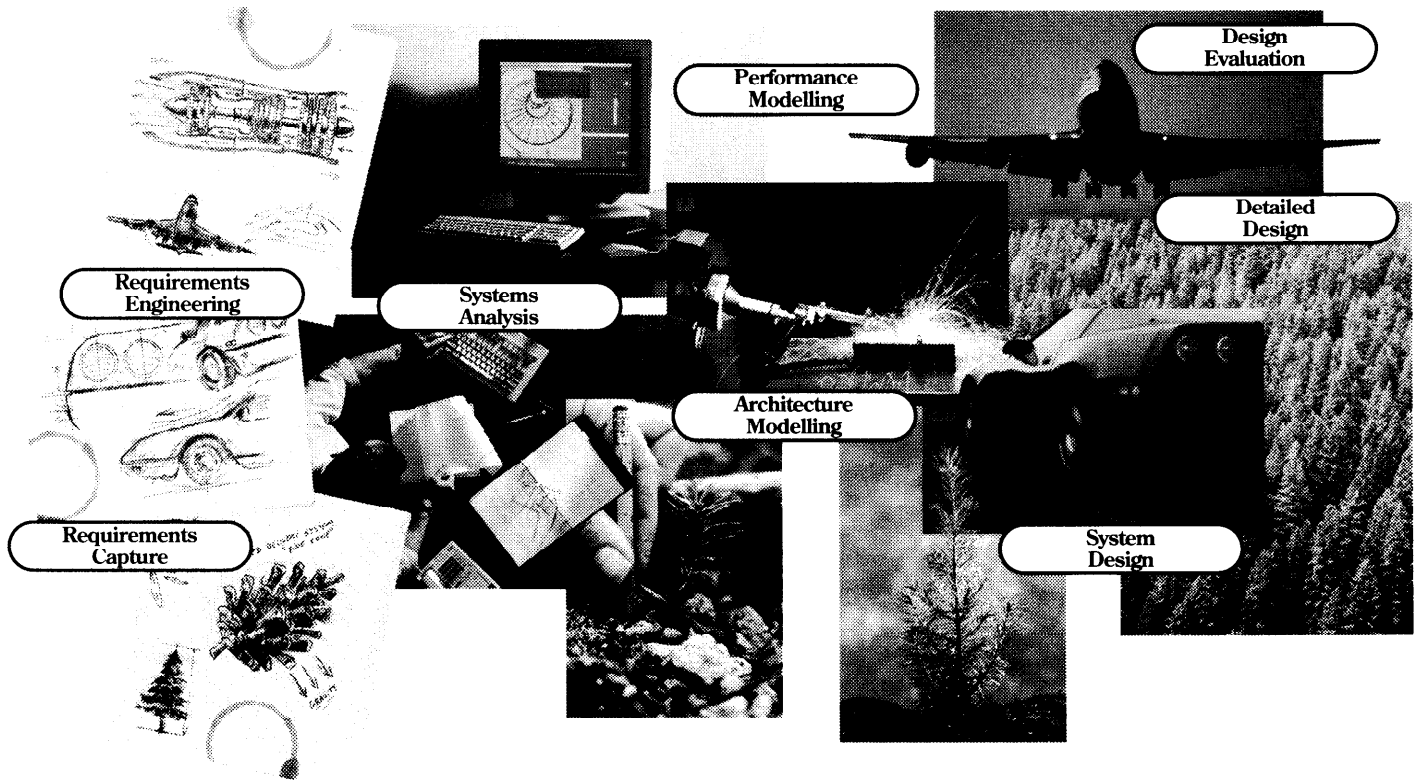
Lennox is in a primarily Hispanic, low income neighborhood about 10 minutes east of the Hughes plant site in Los Angeles, California. I didn't know what to expect when we got there but as a general rule whenever I have to talk to a group of people I always get nervous if I'm not prepared. Luckily, I had run into Don Pendleton who does this stuff all the time and he set me up with this really cool model of the UHF F/O satellite (pre-EHF that is). I also picked up some "props" from Hi-Bay. We walked into the classroom and I immediately knew everything would be okay. As some of you know, I'm not exactly the best dressed engineer at Hughes, but here at Lennox I felt right at home. I was surrounded by jeans, t-shirts, and tennis shoes; these were "my type of people."

Jon, Chuck Judge, Ron Birch, and Garret Murphy went first and talked about what happens when you watch the NBA finals live in Madison Square Gardens,

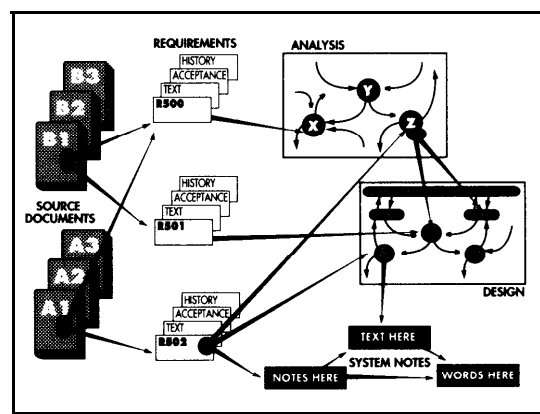
(See Consequence, Continued on page 20)

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{Consequence, Continued from page 18}

the difference between scientists and engineers, and what goes into a satellite. When it was my turn I grabbed the box with the satellite model in it, set it on a table in the middle of the classroom, and asked, "How much does a satellite cost?" Hands went up: "ten thousand," "a hundred thousand," "three hundred fifty thousand and five hundred dollars." I said, "a satellite costs a hundred... million... dollars..." You could have heard a pin drop.

I asked, "How big is a satellite?" Hands again: "as big as a car," "as big as a house," "as big as a city!" I said, "a satellite is one-fourth the size of this classroom." Scattered nods and blank stares.

Then I asked, "do you want to see one?" Pandemonium! At this point, I knew I had a captive audience. I continued, "before I remove the satellite from its protective container, I will need a volunteer to assist me." Hands went up; I picked the smallest kid I could see. His name was Benjamin. I went on, "A satellite is a very complex and sensitive piece of equipment. After all, a satellite costs..." I paused as the class chorused, "A HUNDRED MILLION DOLLARS!"

I pulled out an extra-small smock I had grabbed earlier from Hi-Bay, "a satellite engineer must wear the proper attire to avoid getting the satellite dirty." Benjamin could have camped under that smock. "Even the dust particles in our hair must be isolated from the spacecraft." As I placed the haircap over Benjamin's head, giggles erupted; it was the first time those kids had ever seen anyone with a blue afro. "Most importantly, we must protect the satellite from static charge buildup on our bodies." Benjamin looked a little nervous as I put the grounding strap around his wrist and clipped it to the table leg. I think he thought the satellite would shock him rather than the other way around.

Everything was going great, I had the model out of the box, the receive antenna deployed, and was working on the second solar panel when it happened. Benjamin's ground clip came off of the table leg. He must have jumped half as high as he was tall. I'm certain that when the teacher in the class next door heard the yell, she thought we were torturing the kids into becoming engineers.

After we got everybody calmed down, I started going over the various parts of the model. I explained how the satellite is too complicated for one person to put together. It takes a large team of engineers and technicians to get the spacecraft to the launch pad. Just like a basketball team has forwards, guards, and a center, it takes propulsion, antenna, mechanical and many other types of expertise to make a satellite work right. I told them, "when your satellite is launched and starts operating flawlessly on-orbit, it's like winning the World Series."

Based on their reactions, I actually think they understood what I was trying to say.

Then the questions started to fly. "How do you get the satellite to stay in the sky?" Not an easy question to answer without the proper math background. "Can women be engineers too?" The Hughes engineers all looked at each other and knew that, next time, we needed to include a woman. "How much money does an engineer make?" It was amazing how their mathematical ability improved as they calculated a yearly salary from the hourly wage we told them. We also explained that they'd have to go to college before they could get a job in engineering. The last question they asked before the bell rang was, "do you like your job?" I said, "I wouldn't be here today if I didn't like what I was doing." I really meant it too.

The kids wanted to stay but the next class was arriving. We said our good-byes, got in our cars, and left Lennox Middle School.

I got back to the STE in time to help setup and run a Solar Panel Functional for F06. As I was pushing the stripchart recorder over to the MPS rack, it occurred to me that, with all the stuff I had to get done, talking to those kids was probably the most important thing I'd do all week.

By the way, if you want to talk to kids about being an engineer, contact your communications department at work, or one of your local schools. If you don't have the time, I understand. After all, we're all so busy with matters of consequence.

*First published in Hughes Systems Engineering Operations newsletter.
Reprinted with permission.*

{Pushing, Continued from page 18}

have and the growth we need. Recent products from our working groups are available now through that central office.

This newsletter is an outstanding communications medium. And our presence on the Web is constantly growing. But the next level of the challenge must involve the local chapters, and the interface between them and the central organization. Our members live, work, and contact INCOSE from their local areas. For eleven months of the year, the local chapter is their only contact. We must increase the information flow to the chapters, and chapters must use that information to market new members.

I see a future for INCOSE in which we are the primary recognized voice for international systems engineering, the source of systems engineering methods, and the forum for growth in systems industries.

Now is the time to create that future.

(Eric Honour's thoughts appear regularly in INSIGHT.)

INCOSE On-Line

1996 Symposium Web Site Active!

Steve Tavan, INCOSE '96 Committee, swt@mitre.org

I am pleased to announce that we have activated a Web site for advance information about next summer's symposium. Everyone is encouraged to check out the site, at URL: <http://www.mitre.org/support/incose>

Comments, suggestions, and additional information are encouraged. For those of you who control other INCOSE-related sites, please include this link up.

INCOSE Logo Available in Softcopy

Lew Lee, lew@svl.trw.com

Clipart forms of the INCOSE logo are now available. Contact Lew Lee by email, or call 408-743-4299, extension 5090. The logo can be provided in many configurations including bit-mapped formats, embedded into a word processor file and also in several sizes. The clipart file can be sent over the Internet, made available on WWW, or mailed on diskette (specify PC or Macintosh). Credit goes to Pat Hale for creating the original clipart.

WWW/INCOSE Home Page Update

Pat Hale, phale@eng1.otis.utc.com

Some major additions have been made to the INCOSE WWW site, including the first Technical Committee pages (Modeling & Tools), links to other sites of systems engineering interest and the 1996 Symposium home page link. Material is coming fast and furious, and the site is under almost continuous construction, so check often for updates!

If you have material to be posted on the home page, please e-mail (preferred) the material to:

Pat Hale, halep@eng1.otis.utc.com

or

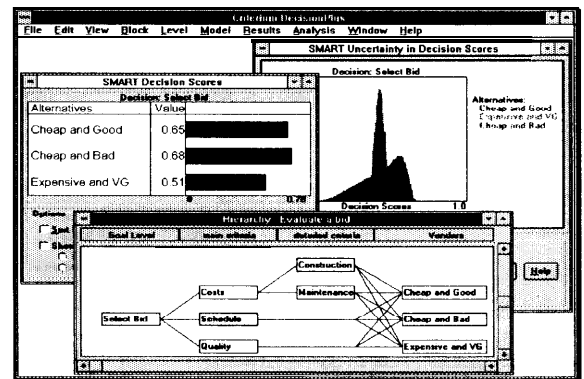
Beth Clark, eclark@advtech.uswest.com

or fax it to Pat Hale at 203-676-6850. For the fastest service in posting the material, please send text in ASCII (plain text) or HTML (text with WWW mark up) and send graphics material in GIF (CompuServe format) or JPEG format, and indicate where to place the graphics. If all this terminology is strange to you, don't give up! Call Pat at 203-676-5250 or Beth at 303-541-8287, and we will assist you in getting your material into a form that is compatible with the WWW.

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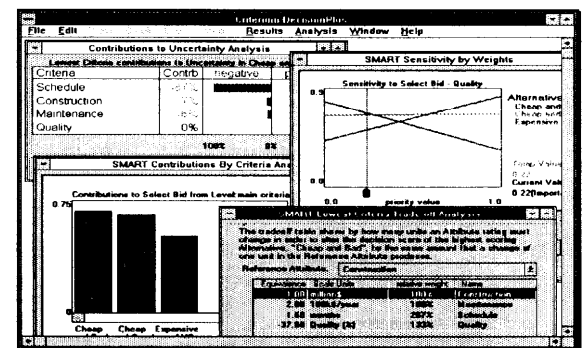
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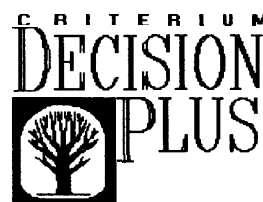


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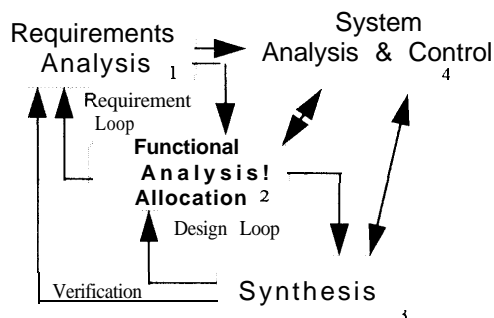
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Rockwell Aerospace

CALENDAR of EVENTS

September

18-20 - Short Course: A Structured Approach to Requirements

Instructor: Dr. Richard Stevens, Zycad Corporation

Location: University of Maryland at College Park

Sponsored By: Chesapeake and Washington Metro Chapters

Contact: Joe Spigai, (310) 985-7200, jspigai@nova.umuc.edu

19 - Chesapeake Chapter, 1996 Officer Nominations due to Nominating Committee

20 - Detroit Tri-State Chapter Meeting

Topic: IEEE Standard 1220 - Synthesis

Place/Time: Location TBD, Program Start 6:30 P.M.

Contact: Tricia Yates, (313) 337-9962

20 - Chesapeake/ Washington Metro Joint Chapter Meeting

Place: The Inn and Conference Center, University of Maryland, University College, University Boulevard at Adelphi Road, College Park, MD

Time: 6:00 P.M.

Speaker: Dr. Richard Stevens, Zycad Corporation

Topic: A Structured Approach to Requirements

Contact: Joe Spigai, (310) 985-7200, jspigai@nova.umuc.edu

21 - Detroit Tri-State Board of Chapter Meeting

Topic: IEEE Standard 1220 - Synthesis (3 in a series of 4)

Place/Time: General Motors Truck, 1996 Technology Drive (Bldg. A), Troy, MI, 6:00-8:00 P.M.

Contact: Joe Bedocs, (313) 594-3475, or Tricia Yates, (313) 337-9962

October

4 - Detroit Tri-State Chapter Meeting

Topic: World Class Systems Engineering

Speakers: Dr. Jerry Lake and Mr. Jim Brill

Place/Time: Ford Motor Company - Product Development Center, Dearborn, MI

10 - Washington Metropolitan Area Chapter Meeting

Panel discussion, 1996 Chapter office candidates

Contact: Joe DeFoe, (301) 527-2902, defoej@lfs.loral.com

11 - Detroit Tri-State Board of Directors Meeting (Open to all interested parties)

Place/Time: ITT Automotive, 6:00-8:00 P.M.

Contact: Joe Bedocs (313) 594-3475

18 - Chesapeake Chapter - Working Group Meetings

Location: Johns Hopkins University Applied Physics Lab

Time: Dinner - 6:00 P.M., Working Groups - 6:30 P.M.

Contacts: Don Kauffman, (410) 583-4130,

kauffman@ascs.aro.allied.com, or Mark Walker, (410)

850-0070 x2057, lmwalker@tasc.com

November

8 - Detroit Tri-State Board of Directors Meeting (Open to all interested parties)

Place/Time: Ford Motor Company, 6:00-8:00 pm

Contact: Joe Bedocs, (313) 594-3475

14 - Chesapeake Chapter Mail Ballots for 1996 Officers Cut-Off Date

14 - Washington Metropolitan Area Chapter Meeting
Topic: Systems Engineering: Computer Based Demonstration

Speaker: Dr. Wolt Fabrycky, Virginia Tech

Contact: Joe DeFoe, (301) 527-2902, defoej@lfs.loral.com

15 - Chesapeake Chapter Meeting

Speaker: Carolyn Buford

Topic: Unique Emerging Telecommunications Applications

Location : Johns Hopkins University Applied Physics Lab

Time: Dinner - 6:00 P.M., Meeting - 6:30 P.M.

Additional Business: Presentation of 1996 Officers, Working Group Meetings

Contacts: Don Kauffman, (410) 583-4130,

kauffman@ascs.aro.allied.com, or Mark Walker, (410)

850-0070 x2057, lmwalker@tasc.com

15 - Detroit Tri-State Chapter Meeting

Topic: IEEE Standard 1220 — Analysis and Control (last in Series)

Place/Time: ITT Automotive, 3000 University Drive (I-75 and University Dr.), Auburn Hills, MI, 6:00-8:00 P.M.

Contact: Dan McClure, (810) 753-0198, or Charlotte Paul, (810) 340-4238

January

9 - Washington Metropolitan Area Chapter Meeting

Topic: Installation of chapter officers, and TBD topic

Contact: Joe DeFoe, (301) 527-2902, defoej@lfs.loral.com

22-25 Winter Business Workshop (by invitation only)

Place: Melbourne, FL

Letter to the Editor:

I just read the Letter to the Editor in the June 1995 *IN-SIGHT*. I like seeing ads. I was fortunate to be able to attend the July Symposium, but it was my first. Up until now, the newsletter provided my only source of advertisements.

Professionally done advertisements can not cheapened a publication. Whether a company can own a particular page of the newsletter is a non-issue. One pays for a specific number of appearances — end of discussion. INCOSE owns the newsletter.

I would like to encourage the use of Help Wanted and Job Wanted ads. Though I currently have so little experience in SE, I can see that this is a valuable service for members. I hope to some day make use of it.

Thank you,
Melanie H. Hazelrig,
hazelrig@superman.msfc.nasa.gov

(Dynamics, Continued from page 17)

ies based on systems thinking and computer simulation informed by a feedback perspective.

Program. The conference will consist of plenary and parallel sessions with deliberate opportunities for relaxed social and professional interaction. Plenary sessions will feature refereed presentations of current developments in system dynamics and exemplary applications of system dynamics and systems thinking. Parallel sessions will cover the range of work being done by system dynamics practitioners worldwide, including:

- ◆ applications of system dynamics and systems thinking in corporate and public policy
- ◆ policy studies emphasizing the role of feedback
- ◆ developments in simulation tools and techniques
- ◆ advances in the modeling process and group model building
- ◆ system dynamics contributions to theory building in the social and natural sciences
- ◆ complex nonlinear dynamic systems
- ◆ contributions to system dynamics teaching materials and methods

The program will include tutorial sessions and workshops led by senior people in the field to provide an introduction to system dynamics, facilitate moving from systems thinking to systems simulation, explore current software, and experience simulation-based flight simulators and learning laboratories.

Location. The conference will be held at the Cambridge Center Marriott Hotel, Kendall Square, Cam-

bridge, Massachusetts. Less than a block from MIT and the Kendall Square subway station, the site is convenient to public transportation providing easy access to and from Boston's Logan airport and downtown Boston. The central location of the Conference and the richness of the Boston area makes this an ideal site for companions and children to accompany conference participants.

Abstracts, presentations, papers, and conference proceedings. Submissions for conference presentations and papers are invited. A written paper is required for plenary presentations but not for parallel sessions. Abstracts for all presentations are due by January 1, 1996, to either of the program co-chairs listed below. They will be peer reviewed, and acceptances mailed February 1.

Plenary presentations will be selected from completed papers only, submitted by April 15, 1996. Notice of invitation to submit a paper for consideration for a plenary session will be mailed February 1 when notices of accepted abstracts are mailed. Material for the conference proceedings is due April 15, 1996. Each presentation, including plenary papers, will be limited to at most four pages in the Proceedings. Presenters are invited to put in the Proceedings an extended abstract, or copies of presentation slides reduced to fit two-to-four transparencies per page, up to a total of at most four pages. Instructions for format will be sent with acceptances in February.

Contacts:

Conference chair

Alexander L. (Jack) Pugh
49 Bedford Road
Lincoln, MA 01773
Phone: 617-259-8259
E-Mail: SDSociety@aol.com

Program co-chairs

John D. Sterman
Sloan School of Management, MIT
Cambridge, MA 02142
Phone: 617-253-1951;
E-mail: JSterman@MIT.edu

George P. Richardson
Rockefeller College of Public Affairs and Policy,
State University of New York at Albany
Albany, NY 12222
Phone: 518-442-3859
E-mail: G.P.Richardson@Albany.edu

INCOSE Infrastructure

Journal Issues Planned

Jeff Grady, Journal Editor, jgrady@ucsd.edu

Staff for the INCOSE JOURNAL was essentially completed with the identification of Associate Editors and Reviewers identified. The Editors were listed in the last *INSIGHT* with mail, email, and phone number contact information. Currently, the editors are reviewing about nine papers. You are encouraged to submit papers to the Editors at any time, but now would be very timely. We are working toward a November 1, 1995 cutoff for the next issue to be sent to the membership toward the end of the year.

If you have any doubt about who to send the paper to, email or call Jeff Grady (619-458-9121). Next year, we plan to publish two issues, one of which will be jointly published with IEEE-AES.

Ca\$h Corner

Barney Roberts, INCOSE Treasurer, broberts@hti.net

U. S. Attorney General Warning: The following message contains suggestions of HARD WORK that will produce POSITIVE OUTCOMES. Slackers, hangers-on, complainers, should exercise caution in reading this material.

The INCOSE Planning and Budgeting Process requires your Directors to begin the planning cycle for FY 1997 now. We are in the process of revisiting our Strategic Plan and updating our Five Year Plan. From those plans, our Prez-in-Waiting, Ginny Lentz, has begun to structure her specific objectives for FY 1997 — see her article in this newsletter for a “Preview of Coming Attractions.”

What's next? Late in October, your Committee Chairs and the INCOSE Officers will receive a tome from Barney Roberts giving them instructions on preparation of a plan and associated budget to execute Ginny's objectives for FY 1997.

So, all INCOSEites who wish to be a part of moving this organization toward the goal of furthering system engineering, contact the committee that matches your interests, and propose projects that meet our needs. Take action now!

What will we do with your proposals? Integrate them, reconcile them with expected revenues, then demand that you deliver! And note: hard work, when it is good work, is fun work!

October: Budget call from your Treasurer.

November: Proposals due.

December: Treasurer integrates, and prepares operating

plan for BOD.

January Business Meeting: (1) BOD gives direction to Treasurer for Priorities. (2) Treasurer reconciles budget to plan, and prepares motion for approval -- BOD approves.

February/March: Treasurer gives direction to Budget Line Item Managers.

April: Your hard work begins, and your Treasurer takes a break until July — then we start all over again.

Think! Strategize with your INCOSE buddies, and get prepared to contribute.

From our New Central Office

Shirley Bishop, Managing Executive, INCOSE@halcyon.com

My staff and I feel privileged to have been selected to provide administrative services to INCOSE. We now have the membership records at our Seattle office, and we welcome questions from individual members or Chapter membership chairs about membership status. We have initiated sending second (reminder) notices for membership renewals, since we know it easy to miss such a notice. In addition, the format of the renewal has changed. The invoice now includes a copy of your membership record, so that it will be easy for you to spot items (telephone, e-mail, etc.) which need to be updated, and to send this corrected form back to the office with your check.

Look for a new INCOSE banner, individualized for your chapter at your local chapter meetings. These banners have been sent to all INCOSE Chapters. Many thanks to Lew Lee, INCOSE membership co-chair, for his work on the INCOSE membership brochure and application — these are now available from our office. An updated list of publications available is sent to each new and renewing member. We look forward to serving you, and to increasing the value of your membership in INCOSE!

Membership Committee Report

Lew Lee, Co-Chair, Lew_Lee@smtp.svl.trw.com

Charged with the enthusiasm of building a stronger and larger membership by providing the services and information needed by INCOSE, we have formed five subcommittees. The subcommittees and their interim charters are:

- ♦ *Organization Recruitment Information Packages Charter.* Develop membership promotion items targeting government agencies, educational institutions, and commercial companies.

- ◆ *Member's Information Packages Charter.* Develop membership information items for prospective members, new members and renewing members.
- ◆ *Organizations To Be Recruited Charter.* Identify organizations that use and can benefit from the use of systems engineering. Organizations include (but are not limited to): government agencies, industries, companies, and academic and research institutions.
- ◆ *Membership Grades Evaluation Charter.* Examine the Board of Directors resolution to institute grades of membership. Estimate the impact to the membership if instituted. Recommend a plan of action.
- ◆ *Map Our Process Charter.* Map the Membership Committee Process.

You'll be seeing and benefiting from the products of these subcommittees in the upcoming months.

The Membership Committee has already provided two important products to the Central Office: an interim information brochure and a streamlined membership application form. These items can be obtained in quantity by contacting the Central Office.

Would your company or organization like to provide additional support to INCOSE?

Ginny Lentz, President-Elect, lentzg@lfs.loral.com

During the INCOSE meeting in St. Louis, the BOD revamped the Institutional Associate as it is identified in the By-laws to be an INCOSE Sponsor — there are now two levels of sponsorship that an organization might chose. Organization, as used here, is any entity that may legally contribute money to a professional society.

Benefits to any sponsor include:

- ◆ Publicity as a systems oriented organization (a listing in each issue of INSIGHT)
- ◆ 12 month membership for designated employee
- ◆ Membership Directory
- ◆ Library reference copy of all publications and Symposium Proceedings
- ◆ Notification of INCOSE meetings
- ◆ Sponsors meeting at Annual Symposium with INCOSE President and Officers
- ◆ Benchmarking with other industry leaders (informally through Working Groups; formal brokering available through VA Tech).

Dues for the above level of sponsor are \$2000 the first year and \$500 per year sustaining.

In addition, for those wishing to steer INCOSE, there is membership on the Corporate Advisory Board (CAB) with the following additional benefits:

- ◆ A representative on the CAB
- ◆ CAB meetings at both winter and annual meetings to review INCOSE progress and update guidance.
- ◆ CAB dinners with the BOD, the executive officers and the Chairman of the Technical Board.
- ◆ Recognition in the INCOSE Journal
- ◆ Company Logo displayed at the Annual Symposium
- ◆ One complementary Executive registration for the Symposium
- ◆ Voting rights to select the CAB's two representatives to the INCOSE BOD

Dues for CAB Members are \$10,000 the first year and \$2000 each subsequent year.

CAB Membership is for those who want to steer INCOSE by providing guidance on the overall direction, focus and priorities, as well as on the Symposium, work with academia for improvements in SE education and who wish to sell SE as good business practice. CAB membership is not just for the big aerospace and defense firms....many of the current members are diversified across government and commercial sectors.

Board of Directors Meetings in St. Louis

Joe DeFoe, Secretary, defoej@lfs.loral.com

At the symposium in St. Louis, four board of directors meetings, lasting twelve hours and ten minutes, considered forty-eight agenda items. Of course, individual members of the board put in uncounted additional hours outside the four meetings. Fifty documents, over 380 pages, were presented to the board. The meetings produced twenty-five action items — thirteen of which were closed during the symposium. The board considered eighteen formal resolutions. Sixteen were approved; one was tabled once an action item was created to assure the issues it raised are worked before the January meeting; and one was withdrawn once it was overtaken by events.

Among the adopted resolutions of general interest to the membership are:

- ◆ Term of office of the treasurer aligned with the INCOSE fiscal year.
- ◆ Non-CAB member Sponsor (formerly, Institutional Associate) created — dues: \$2000 initiation, \$500 sustaining.
- ◆ Number of directors increased to 18 from 17. The new at-large director will represent the CAB.
- ◆ INCOSE definition established for system. "A system is an interacting combination of elements viewed in relation to function."
- ◆ Affiliation established between INCOSE and the Systems Engineering Society of Australia.
- ◆ INCOSE working group and technical committee

products (items like the CAW SECAM and Metrics Handbook) will be offered for sale for INCOSE's cost of production and shipping.

Preparing for the January Board of Directors Meetings.

Planning work has begun for the January board meetings. The secretary already has in hand nineteen tentative agenda items. Committees and members with items that need to come before the board should work through the appropriate regional and at-large directors to funnel potential items to Ginny Lentz, president-elect, Joe DeFoe, secretary, or Shirley Bishop, managing executive.

When bringing an item to the board members should provide supporting information, recommended actions, and draft resolutions to the secretary prior to the meeting. The INCOSE office will distribute the items to the board for study in advance. Where this cannot be done, copies should be brought to the meeting. A copy of any material presented must be provided to the secretary at the time at the board meeting.

A presentation is made to the board for one or more of the following reasons:

1. To provide the board information germane to overall direction of INCOSE.
2. To ask the board to take action, direct action, or to assign an action item.
3. To ask the board to set new policy or to change an existing policy.

When coming before the board for reasons 2 and 3, please have the text for the action item or the draft resolution. These items, like good requirements, should be specific and unambiguous. To illustrate the difference between an action item and a resolution, consider the following examples. (1) Your working group feels that a special ad hoc committee should be created to develop an INCOSE position on a new, critical government initiative: here you would come to the board with a draft action item. (2) The ad hoc committee has completed its work: here, come to the board with a draft resolution stating the proposed INCOSE position.

INCOSE SFBAC Outreach Program

George J. Vlay, 07g21b49@svpal.org

The SFBAC has initiated two outreach programs to promote the activities of INCOSE. The first concerted effort is with the Stanford, Santa Clara and San Jose State Universities. Letters have been sent to the three Engineering

Dean's of these Universities and thirteen Chairs of their respective Electrical, Mechanical, Industrial and Aerospace Engineering Schools. Meetings have been held with the Stanford Electrical Engineering Chair and the San Jose State Mechanical Engineering Chair and additional efforts are planned with these schools.

The second outreach activity is with members of the Silicon Valley Engineering Council which is composed of 26 Engineering Associations, Societies and Organizations. Letters have been sent to each Chairman, President or Senior Officer offering the potential of a joint meeting with their organization on a topic that would be meaningful to both organizations members.

The Society for Computer Simulation, the Instrument Society of America and the Society of Manufacturing Engineers have expressed interest towards establishing joint meetings with SFBAC during the remainder of 1995.

1996 Accomplishments: A Look Ahead

Ginny Lentz, President-Elect, lentzg@lfs.loral.com

As "Prez-in-waiting," one of my official responsibilities is to guide the operating plan and budgets for the next year. The following are the goals and objectives the BOD wishes me to execute during my tour of duty:

Information — we have a good start with one Journal, regular high quality newsletters and the information and technical committee products that were announced at St. Louis. . . .we need more information produced in all categories from Information Papers to the Journal.

Increases — in the membership — both individual and Sponsors — and in member retention — I would also like for us to regain lapsed members.

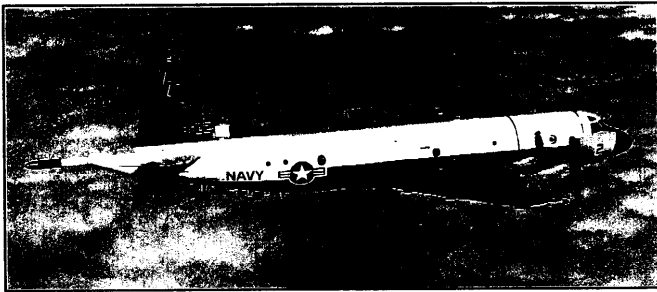
The third focus area is *Integration* — I noticed at St. Louis, that we have turned the corner from an organization that is "forming" (when people have high expectations, eagerness, look to authority and hierarchy to determine where they fit) to an organization that is "storming" (where the discrepancy between hopes and realities appears, there is dissatisfaction with the authority, general frustration and power struggles). The key to moving from storming to norming and, ultimately, performing, is resolving roles and responsibilities, getting the problems scoped, getting started on something, and then channeling that energy toward synergy with the goals above.

The officers and committee chairpersons will soon be receiving a charge from me and an associated budget call from the treasurer to support this plan. Please consider how you can help advance the goals of INCOSE, contact the appropriate committee chairperson, help prepare a program and budget. Keep the sleeves rolled up — and INCOSE will just keep getting better and better. Thanks to all our volunteers.

Winter Workshop

To reflect the intense amount of real work that gets accomplished at INCOSE's annual January meeting, the name has been changed to Winter Workshop, replacing the previously named Winter Business meeting.

Meeting Tomorrow's Technology – Today



At Loral Defense Systems-Eagan (LDS-Eagan), we work on exciting, state-of-the-art programs that directly affect the advancement of technology around the world. From maintaining national defense, to delivering the mail, to keeping air traffic flying smoothly, LDS-Eagan is committed to leveraging complex systems into mission-critical solutions. This commitment, along with our diversification into global markets, offers you ongoing opportunities and challenges.

LDS-Eagan, located in Minnesota's Twin Cities of Minneapolis and St. Paul, is a premier systems integrator for U.S. and international governments. We are distinguished by our work in Navy combat systems, maritime avionics, air traffic control systems, tactical C⁴I, and postal systems. We are dedicated to developing and integrating the most innovative technological solutions, providing you with a world of opportunity.

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B.S. in engineering, math, or physics and 7 or more years experience.

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Experience in complex avionics systems from definition through integration and flight test.

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- Define and characterize analog and digital interfaces commonly used in aircraft environments
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- Translate customer and mission requirements into detailed hardware and software functions and generate subsystem configuration item specifications
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- Understand message formats, protocols, and message processing software commonly used in military data link systems. Networking hardware and protocol experience are desirable.
- Familiarity with and practical knowledge of MIL-STD-188 series documentation, and STANAGs relating to communication systems.

SOFTWARE ENGINEERS

B.S. in computer science and 6 or more years of applicable experience.

- Object-based design methodologies
- Workstation-based integrated CASE tool environment
- PC/workstation-based GUI development (X-Windows/Motif)
- DOD-STD-2167A development
- UNIX systems administration
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Take the first step toward a satisfying career with Loral Defense Systems-Eagan. Send your resume today: Human Resource&W, Loral Defense Systems-Eagan, PO. Box 64525, MS U1 D20, St. Paul, MN 55164-0525. An affirmative action employer committed to workforce diversity.

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GENERAL INFORMATION

Just What is "Systems Engineering" **Anyway? A Light Hearted Look at** **Definitions**

Larry Pohlmann, pohlmann@boeing.com

At the organizing meeting of INCOSE in July 1990, the 34 participants present consciously decided that they did not need to reach a consensus at that time on a single definition of "systems engineering." They did, however, recognize that among the group there were four differing viewpoints.

Some viewed systems engineering (SE) as architecting the system and the relationships among the subsystems that make up the "system." Others preferred to emphasize that SE is the management and coordination of the efforts of a multi-disciplinary engineering team. Still others emphasized the front-end efforts to establish and understand requirements, and to develop the system and subsystem specifications. Lastly, some emphasized the integration and testing of the evolving system.

On the basis of definition-related discussions among INCOSE members, several additional viewpoints (or nuances, depending on your viewpoint and/or enthusiasm) can be identified and espoused.

It has been, and can be argued that SE:

- ◆ is focused on satisfying a functional need
- ◆ is higher order engineering
- ◆ is too often confused with the organization of the same name
- ◆ is anything that someone who calls himself a systems engineer does
- ◆ is (merely) another branch of engineering
- ◆ is — or should be — concerned with the entire life-cycle of a system. i.e., from "lust to dust."
- ◆ is growing to include increasing consideration of geo-political issues and fiscal constraints in our current environment
- ◆ as the engineering of large, complex systems has much in common with concurrent engineering, and integrated product development
- ◆ is really only the combination of the scientific method and engineering applied to complex systems
- ◆ is very different in military and commercial environments
- ◆ is very different in different companies
- ◆ is not really a separate discipline, but (merely) a skill that is (or should be) used by all engineers and engineering managers.

It has been, and can be argued that SE definitions:

- ◆ will never be precise and concise enough to please all of the people all of the time
- ◆ should be chosen (carefully, from among those available) to achieve a near term objective
- ◆ are not infinite, but are too numerous to count
- ◆ are really only necessary for those of us who either don't understand, or are insecure, or both
- ◆ are really unnecessary — and besides it is impossible to get true consensus
- ◆ are absolutely necessary if we are to communicate what we really do (or need to or want to or think we need to do)
- ◆ are really impossible to systems engineer — even for (good) systems engineers (so why bother??)
- ◆ are a fun pastime when we don't have real serious SE work to do

Just What Is "Systems Engineering" Anyway? We may not be any closer to a single agreed upon definition of SE, but more of us are thinking about it than ever before! This may be good!!

INCOSE Library Getting Started

Bill Schoening, m138022@SL1001.mdc.com

To provide greater insight into INCOSE and assist those doing literature searches, the Communications Committee is developing an index of all papers published under the auspices of INCOSE. We are starting by preparing an index of the INCOSE Symposium Proceedings. Papers will be indexed by subject and author, and abstracts will be included in the index.

Your help is needed in five areas:

- 1 Determining the appropriate technology to be compatible with WWW systems.
- 2 Contacting authors to fill out a questionnaire on applicable subject areas for the index.
- 3 Transcribing questionnaire results into a database.
- 4 Preparing abstracts, titles, and author names for 1991-94 from the 1994 CD ROM. (Data can be downloaded as text files.) Abstracts from the 95 Symposium are already prepared.
- 5 Constructing the index.

As the index progresses, the information, including abstracts, will be installed on the INCOSE WWW home page.

If you would like to help, contact me at the Internet address above or at 314-234-9651. We will divide the tasks into small parts so your part can be accomplished in a reasonable time.

An Interview with Ginny Lentz, INCOSE President-Elect

Interviewed by Beth Clark, Communications Committee

What do you hope will be your greatest accomplishment as an INCOSE officer?

Getting all the energy focused on producing. Currently we have several whirling dervishes and we are at the sensitive junction where the originating few are handing off to the mindful hordes — kinda like letting the kids take over the family business after the kids returned from a ten-year absence.

What is your particular interest in systems engineering?

I'm a Myers-Briggs INTJ, so I can improve anything. Seriously, I like exploiting computers to solve real problems for real people, those who don't necessarily care about computers, just trying to do their jobs.

What heuristic do you use most in your systems engineering work?

Heuristic is a new fangled COMP SCI word kinda like instantiation — I go back to basics: what is the requirement, what are the alternatives, which is best for this situation, can we do it, what are the risks?

Many of us find ourselves using systems engineering techniques in our personal lives. What is your most successful application outside of work?

The garden clubs with which I am associated decorate an old mansion, now the Montgomery County, MD Art Center, each holiday season with live greens. We have requirements and unknown end users who use the building for parties and weddings and their needs are conveyed to us through the staff at the Center. We also have to be compatible with the art that will be hanging during the season. We decorate the entrance and a number of rooms and have a unifying theme. There are also 12 windows across the front for which we need wreaths. There are 33 Garden clubs in the district and 20 of them generally participate doing a room or making a wreath. As Chairman of the event, I had to layout the program (architecture and solution concept), get volunteers, coordinate detailed design, manage the two-day install and four-hour tear down.

What is your favorite way to forget about systems engineering?

Needlepoint, the really mindless kind; counted cross stitch takes too much concentration.

Biographical Information

Ginny Lentz is a graduate of Purdue University and the Defense Systems Management College, Program Management Course. She joined IBM Federal Systems right

out of college, beginning her career as a programmer on projects such as SAFEGUARD, where she had the opportunity to brief Henry Kissinger (who was dressed in sandals and slacks). Ginny has worked as a systems engineer, systems engineering manager, and marketer on a number of DoD and commercial projects. While assigned to corporate headquarters, Ginny taught systems engineering and applied SE principles to the organization and the processes by which the organization did business.

Ginny joined the NCOSE gang early-on, got the CAB going, helped start the NCOSE Washington Metropolitan Area chapter, and gathered the resources to put on the '93 Symposium. She is now working in Loral Federal Systems Air Traffic Control Division, trying to keep things on track wherever there are fires to fight and processes to fix.

An Interview with Dorothy Kuhn, Region III Director, Industry.

Interviewed by Beth Clark, Communications Committee

What is your particular interest in systems engineering?

Over the past two years I have worked SE automation and process issues. I was part of a TI team chartered to research and choose a standard SE toolset. I have been TI's author on the Industrial Collaboration's team to create a process maturity model for systems engineering. This year we are improving version 1.0 of that model and assessment method, as well as investigating the potential in extending the model to integrated product development.

What is the role of the NCOSE Regional Director?

The role of each regional director is to liaison with the local chapters. We're here to get you what you need and to understand the problems you might need national's help to solve. The regional directors are your voice to the Board of Directors.

What is your favorite way to forget about systems engineering?

I sing in my church's choir, garden, ride bikes with my husband and our 4-year-old son.

Biographical Information:

Dorothy A. Kuhn has worked in Systems Engineering since 1979. Her technology experience includes radar, acoustics, information and missiles. She has been investigating systems engineering processes, methods and tools issues exclusively since 1992. Her undergraduate work is in Physics, and she recently completed her masters work with a thesis titled "Automating Systems Engineering."

Dorothy has represented Texas Instruments on IN-

COSE working groups and is currently a Region III Member to the Board of Directors. Additionally, she is Director at Large of the North Texas Chapter of INCOSE. She and her husband, Marshall N. Surratt, make their home in Frisco, Texas. They are active in their church and community, and are the parents of a young son, Stefan O. Surratt.

Seen Elsewhere: Systems Engineering by Another Name

Contributed by Beth Clark, Communications Committee, eclark@uswest.com

Many companies and government organizations have undertaken massive business re-engineering efforts that involve extensive information systems (IS) projects to enable radical business change. Despite earnest determination, most re-engineering efforts are only marginally successful in bringing about holistic, broad-based change. Business people are surprised by the difficulty in knitting together a working business model agreeable to all constituencies. IS departments often can not deliver the systems and technology to enable the rollout of the new business model. Unfortunately, many of those involved do not seem to know went wrong, when it went wrong, or how it could have been avoided.

In "Successful Re-engineering Demand IS/ Business Partnerships," Erin Martinis, a consultant with Computer Sciences Corporation, defines "an orderly approach to facilitate business re-engineering." He presents five steps toward better re-engineering by assigning to the IS organization the functions of project management and technical vision and leadership. Many of the tasks described are common to systems engineering, for example:

- ◆ translating business vision to technical reality.
- ◆ developing an information technology architecture.
- ◆ developing transition plans and migration strategies.

Martinez calls this approach a melding of traditional and breakthrough management practices. I call it good engineering — systems engineering, that is.

Martinez, Erwin, "Successful Re-engineering Demand IS/Business Partnerships," Sloan Management Review, Summer 1995, pp 51- 60.

Why I Volunteered to Be a Member of COMM2 (and Why You Should, Too!)

Dona Lee, new Communications Committee member, sl@cais.com

- 10) I decided I should just do it — by contacting valerie@lfs.loral.com.
- 9) I get to wear a cool red T-shirt with the mysterious COMM2 logo (if Pat Hale ever comes through with the goods).
- 8) I get to use the latest technology from telecommunications to the World Wide Web. Kool stuff!
- 7) I can disprove the stereotype that engineers can't communicate.
- 6) I can influence how the image of systems engineering is communicated to the world by signing up for a project and running with it. No micromanagers here.
- 5) I can sleep peacefully at night knowing I'm doing the right thing supporting INCOSE.
- 4) I finally know what COMM2 stands for.
- 3) I can see my name in print...a la INSIGHT.
- 2) I can work with some of the friendliest, hard working, committed volunteers around. (No offense intentionally given to anyone not on COMM2.)
- 1) I can be one of the first to see Stan Long's newest cartoon.

(Challenge, Continued from page 1)

tems such as the Space Shuttle, the AEGIS combatants, Tomahawk, the Trident submarine and the F-22 fighter. The workshop goal was to initiate a proactive community participation to ensure a wise investment in engineering technologies and highlight policy changes where necessary. Invited participants were organized into focus groups to address the issues facing the community responsible for engineering complex systems.

Dr. Harry E. Crisp, Program Manager for Engineering of Complex Systems (an Exploratory Development program sponsored by the Office of Naval Research) and Moderator of the workshop, recently spoke about the importance of the workshop to the Navy, industry and academia, how it has evolved from last year's workshop, and how this type of forum could advance technology well into the future. *The following paragraphs are a condensed version of his remarks...*

The systems that the Navy and Department of Defense (DoD), are concerned about are the systems that involve multiple disciplines.. sensor technology, propulsion technology, materials technology and ordnance systems. These bodies are also thinking in terms of the next generation systems. Outside the DoD arena, looking to commercial examples of complex systems, this includes things like intelligent highways, next generation versions of air traffic control, airport automatic baggage handling systems — even new cars have complex elec-

(Continued from page 31)

tronics, computers and sensors. Almost every system out there today has a computer in it. The problem is that as these systems get larger and more sophisticated and rely more on automation to achieve their functionality and performance, the challenges to engineering these systems become incredibly complex and difficult to carry out.

In years past, engineers were able to use what Crisp refers to as "seat of the pants" methods, or rules of thumb, to deal with these problems. By sheer persistence, ingenuity, and innovative approaches, engineers were able to field these large-scale systems. Success was often achieved at a great price in terms of resources that had to be applied — funds, time and personnel. Engineering the next generation of these systems must minimize the excessive amount of resources that have to be applied in order to realize our problem. Also, with all of the changes that are occurring, the changing global situation, budget priorities, acquisition reform, a shift towards commercial components, downsizing and restructuring within industry and government — all of these issues have a major impact on our ability to engineer the next generation systems.

This understanding was the driving force behind the workshop. We initially thought in terms of something that was pretty much restricted to the Navy community.

We thought, "Let's establish a link to those acquisition programs within the Navy and the research side of ONR, and get people together to examine what we're doing with engineering of complex systems." As we began to structure the workshop, we realized that it wasn't something that we should limit to the Navy — that we needed to reach out to the rest of DoD and get the Air Force and Army views on approaches to addressing these kinds of problems. So we began to think in terms of reaching out to the broader community.

The payoff from having a workshop like this is in the form of an investment strategy for the long term that would be beneficial not only to government, but also to industry and the universities.

The workshop brought together a complete cross section of folks from many disciplines. People with hardware background, software background, people that had specific expertise in areas such as sensors or materials, people with the research perspective, the hands-on engineering perspective, as well as the acquisition manager perspective. So, the workshop took on a very multidimensional approach.

Recognizing that INCOSE is the only organization whose primary focus is on engineering the systems of systems, it was a natural participant from the very beginning. Several active INCOSE members head our focus groups — Walter Beam, Jeff Grady, Jerry Lake, and Brian

Mar all played an important role in last year's event. In addition, we had INCOSE members within many of the groups.

After the first WES 21 in the Fall of 1994, then-INCOSE President George Friedman contacted RADM Marc Pelaez, Chief of Naval Research to pledge INCOSE's support for the efforts. This workshop serves as a bridge, in a sense, across all of the members within INCOSE specifically working on large, complex systems... It's a forum that we can use to create the collaborative environment we need to engineer complex systems in the 21st century. This year's workshop took on a much broader viewpoint. First, participation was expanded globally with representatives from Sweden, The Netherlands, and England. It was also redesigned to include fuller representation from those groups within the engineering community responsible for large systems. A Technical Program Committee was established, building on INCOSE's early support, and now includes representatives from a number of professional societies and associations including AIA, AIAA, ASME, ASNE, EIA, IEEE Computer Society, IEEE Computer Society Task Force on Engineering Computer-Based Systems, INCOSE (Brian Mar, University of Washington), NSIA and SOLE. Based on the Committee's guidance, the number of focus groups was expanded from 6 to 13, and included more emphasis on systems engineering problems. You'll note that this year's focus groups once again draw upon talented INCOSE members to serve as leaders:

Computer-Based Systems Implementation, Ginny Lentz
Design Capture, Brian McCay
Domain Engineering, Stephanie White
Evolutionary Systems, Joe Chiara
Infrastructure and Tools, Dave Oliver
Organizational/ Institutional Learning, Jeff Grady
Program Management of Complex Systems Acquisition, Al Skolnick
Re-engineering, Evan Lock
Revolutionary Systems, Eric Honour
Standards/ Metrics/Quality, Richard Evans, Andy Sage
Systems Architecting, Bill Carlson
Systems Assessment, Barney Morais
Systems Engineering Management, Jerry Lake

We're currently integrating the groups' recommendations to create a comprehensive view of the needs of the engineering enterprise of the 21st century. WES 21 will continue as an annual event.

Five years from now, I would like to see a true collaborative spirit evolve out of this between government, industry and the universities. That's what our goal has been from the beginning. It is essential to establish that spirit so that we have a common understanding of what the needs are and how we can contribute to realizing the solutions to those needs. Industry can not go it alone in

investing in new technology systems that may not have a real payoff in terms of product line or business base for them. Government agencies must collaborate and establish partnerships with industry to make sure that those capabilities exist or are realized. At the same time, the government cannot afford to fund the entire infrastructure. We need to provide guidance to industry and universities some with regard to our needs and how they can help us. I'd like to see the Navy establish bridges between the research community, the acquisition community, the education system and engineering societies. By adopting new approaches, new processes, and using the best available infrastructure and tools, we have the opportunity to advance the state-of-the-art and the state-of-the-practice in engineering large scale systems for the 21st century.

A more detailed description of focus group discussions is included within the WES 21 proceedings. The intent of these workshops is to build consensus and synergy to initially baseline the practices and methods pertaining to the design and development of complex systems and to then extend this knowledge base. If you wish to participate in this on-going initiative or if you need more information about this program or a copy of the 1995 proceedings, please write: WES 21, P.O. Box 6881, Arlington, Virginia 22206, or contact Dr. Crisp via e-mail: hcrisp@relay.nswc.navy.mil. Additional information about on-going work being performed under ONR sponsorship may be obtained via the Engineering of Complex Systems World Wide Web Home Page (<http://coral.nswc.navy.mil>).



Attention!
All Local Chapter Presidents!

**Plan to meet at the Winter Workshop
in Melbourne, Florida,
on January 22-25.**

Be prepared to discuss:

- 1. Local chapter success stories**
- 2. Local chapter challenges**
- 3. Recipes for growing membership**
- 4. Prescriptions for keeping a healthy chapter**

**See you there,
Nancy Rundlet**

Book Review

The Fifth Discipline: The Art and Practice of the Learning Organization

by Peter Senge

Currency Doubleday, 1990

paperback \$18.50, 423 pages

Reviewed by Beth Clark, Communications Committee

In "The Fifth Discipline," Peter Senge claims that the only sustainable source of competitive advantage is organizational learning. The five basic ingredients of a learning organization are systems thinking, personal mastery, mental models, shared vision, and team learning. To oversimplify, he asserts that people should identify and put aside their old ways of thinking (mental models), learn to be open with others (personal mastery), understand how their company or industry really works (systems thinking), form a plan that everyone can agree on (shared vision), and then work together to achieve that vision (team learning). In plain language, a learning organization is one in which people at all levels, individually and collectively, are continually increasing their capacity to produce results they really care about. Why should organizations care? Because, the level of performance and improvement needed today requires learning, lots of learning.

Senge received his Ph.D. at MIT in systems dynamics and believes that systems thinking can help people see the world as a whole. The tools of systems thinking have been applied to understand a wide range of corporate, urban, regional, economic, political, and ecological systems. According to Senge, "Systems thinking is needed more than ever because we are becoming overwhelmed by complexity. Systems thinking is a discipline for seeing the 'structures' that underlie complex situations, and for discerning high from low leverage change." There are two types of complexity: detail complexity and dynamic complexity. Conventional systems analysis, Senge asserts, is designed to handle detail complexity, but is particularly ill-equipped to deal with situations where cause and effect are subtle and where the effects over time of interventions are not obvious. Says Senge, "In fact, sadly, for most people 'systems thinking' means 'fighting complexity with complexity' devising increasingly 'complex' (we should really say "detailed") solutions to increasingly 'complex' problems. In fact, this is the antithesis of real systems thinking."

He states that the essence of systems thinking is see-

shots. Systems thinking, says Senge, starts with understanding the “reinforcing and balancing feedback and delays” concepts of cybernetics and that certain patterns of structure occur again and again. A half-dozen “systems archetypes” are presented.

An example of systems archetype applicable to the development of complex systems is the tragedy of the commons. The idea is that given unrestricted access to the Boston Common, farmers would graze too many sheep there, ultimately depleting the grass and ruining grazing for all. Ecologist Garrett Harding first coined this term to describe situations where two conditions are met: (1) there exists a “commons” a resource shared among a group of people, and (2) individual decision makers, free to dictate their own actions, achieve short-term gains from exploiting the resource. By understanding this archetype, systems engineers can deal directly with problems where apparently logical local decision-making becomes illogical for the larger system. Service industries, including U S WEST, are using systems thinking techniques to understand service delivery processes. By identifying where delays are most likely to occur and putting solutions in place to reduce delays, companies can maintain high levels of customer satisfaction.

The bottom line of systems thinking is understanding that the best results come not from large-scale efforts but from small well-focused actions. Many of us consider ourselves to be systems thinkers — after all we build system, practice systems analysis, call ourselves systems engineers. Systems engineering techniques tend to focus on the static structure of systems and how to manage the complexities of scale that arise in large systems. Without a working understanding of systems thinking, it seems unlikely that systems engineers will find be effective in developing sustainable solutions. I submit that mastering systems thinking is essential for all systems engineers.

Other Readings in Systems Thinking

Compiled by Thomas C. Bagg, III, Chesapeake Chapter,
tom.bagg@gsfc.nasa.gov

Checkland, Peter, *Systems Thinking, Systems Practice*
John Wiley, New York, 1981

Forrester, Jay, *Industrial Dynamics*
Productivity Press, Portland OR

Forrester, Jay, *Principles of Systems*
Productivity Press, Portland OR

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MIT Press, Cambridge Mass, 1969

Beer, Stafford, *Brain of the Firm, Second Edition*
John Wiley & Sons, New York, 1981

Beer, Stafford, *The Heart of the Enterprise*
John Wiley & Sons, New York, 1979

Schwartz, Peter, *The Art of the Long View*
Doubleday Currency, New York, 1991

Senge, Peter, *The Fifth Discipline Field Book, Tools, Techniques and Reflections for Building a Learning Organization*
Doubleday, New York, 1994/1995

In Cyberspace:

Learning Organization Home Page:
[http:// world.std.com/](http://world.std.com/) -10

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About INCOSE

INCOSE is a 1500+ member professional organization of systems engineers and others interested in systems engineering. Members come from the United States and at least ten other countries. Over twenty local chapters across the United States are joined by chapters and emerging chapters in the UK and Canada, and an affiliated organization in Australia. The INCOSE board of directors is comprised of six elected officers (a president, past president, president-elect, and secretary and treasurer), ten regional directors from the five US regions, one at-large director, and two representatives of the Corporate Advisory Board. "n" companies support the organization as Corporate Advisory Board members, sending representatives, an initial donation, and yearly sustaining donations.

The purpose of INCOSE is to foster the definition, understanding, and practice of World Class Systems Engineering in industry, academia, and government. Potential members are urged to contact our central office for information; the address is given below.

INSIGHT information

This publication is a product of the Communications Committee, part of the International Council on Systems Engineering (INCOSE).

Editor: Valerie Gundrum. Contributing editors include Ellen Barker, Beth Clark, Pat Hale, Dona Lee, Lew Lee, James Sanchez, Sarah Sheard, Bill Schoening, George Vlry.

INSIGHT is published four times per year: March, June, September, and December. Inputs for the December issue are due November 17. For e-mail articles, please specify the subject line as: Input for *INSIGHT*. Direct your inputs **and inquiries** as follows:

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Local Chapter Reports

James Sanchez, Communications Committee,
jsanchez7@msmail4.hac.com

Submit your 150-200 word article that includes accomplishments and recent events. Also, include upcoming dates, speakers, topics, place, time, and contact (name, phone, e-mail) for the *Calendar of Events*.

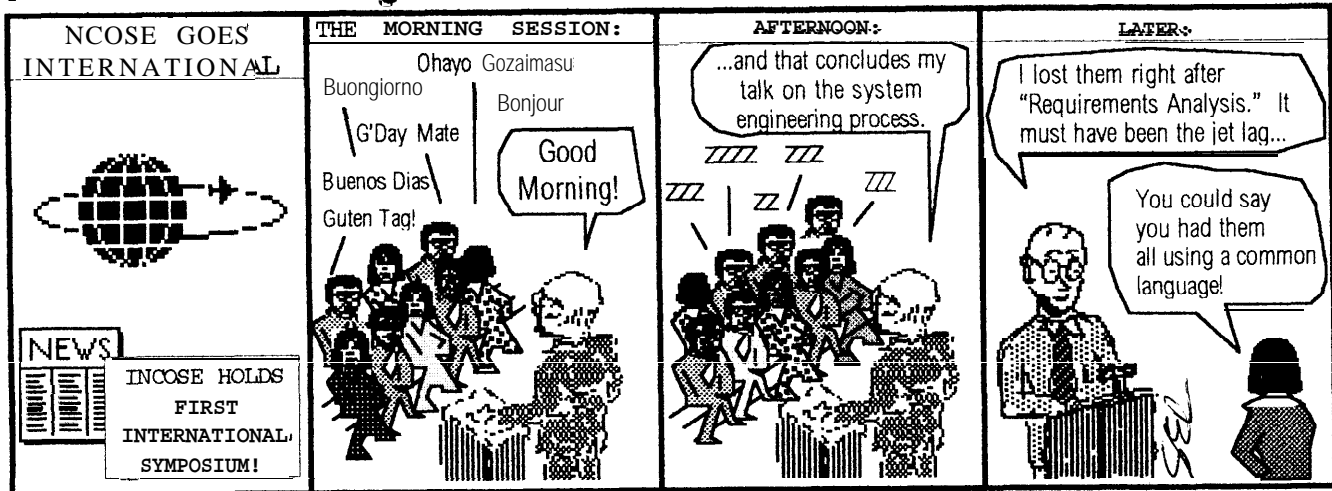
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Beth Clark, Communications Committee, eclark@uswest.com

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